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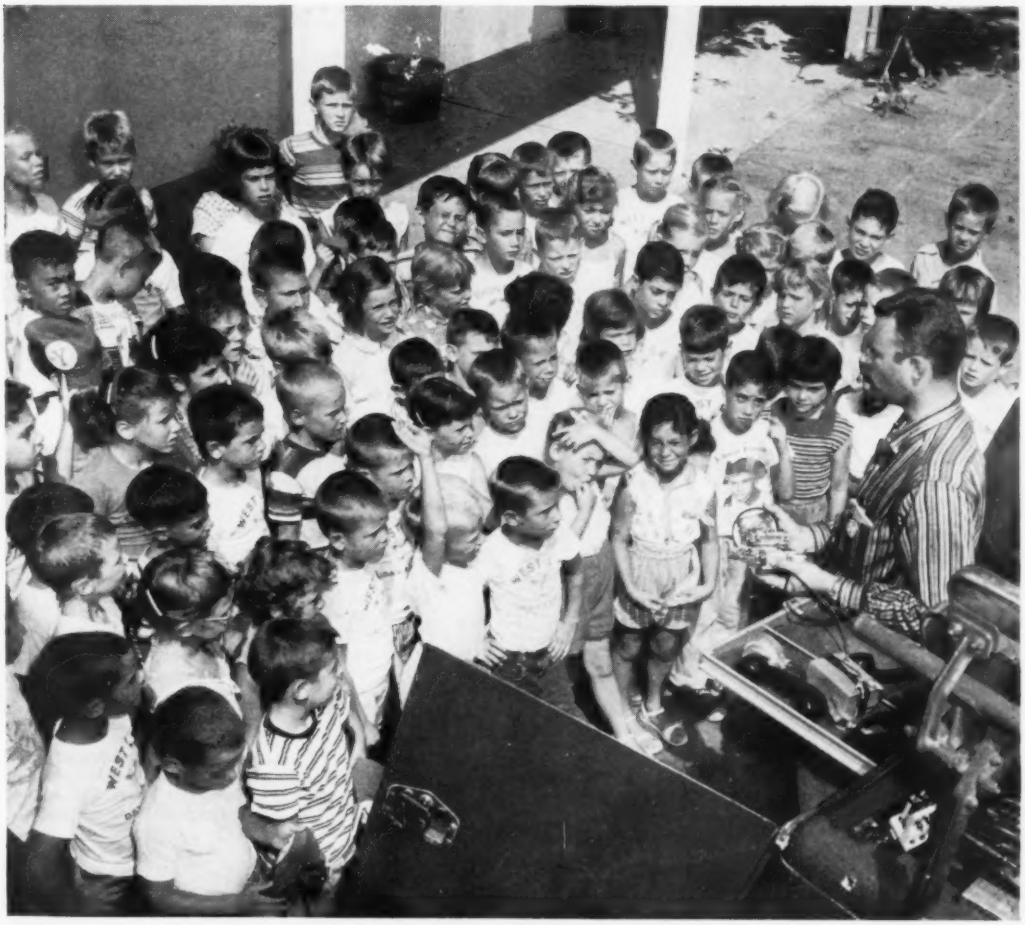
Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY



INSIDES OF A TELEPHONE

Engineering Fieldman Frank Dudley of General Telephone Co. of California points out wonders of the telephone mechanism to children attending summer program series offered by YMCA.

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ELECTRONICS SECTION — Page 23

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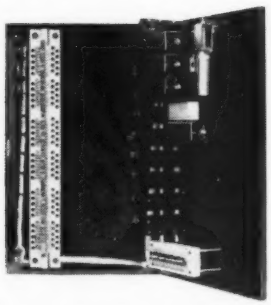

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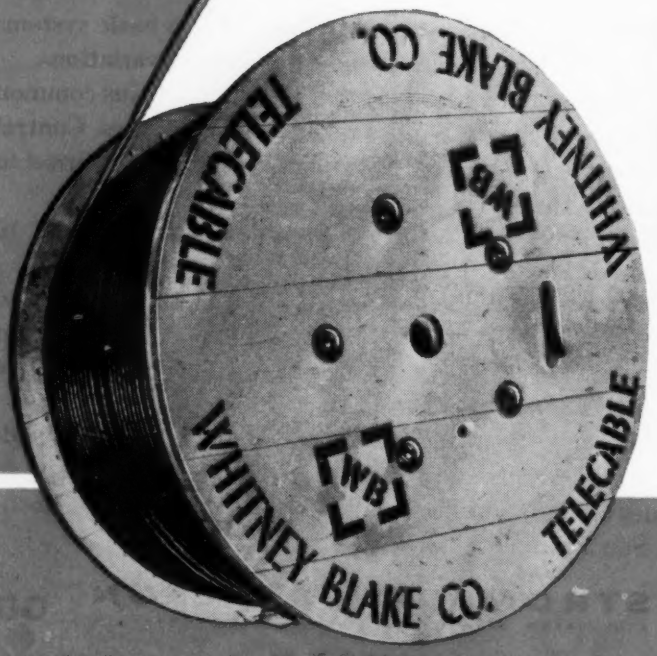

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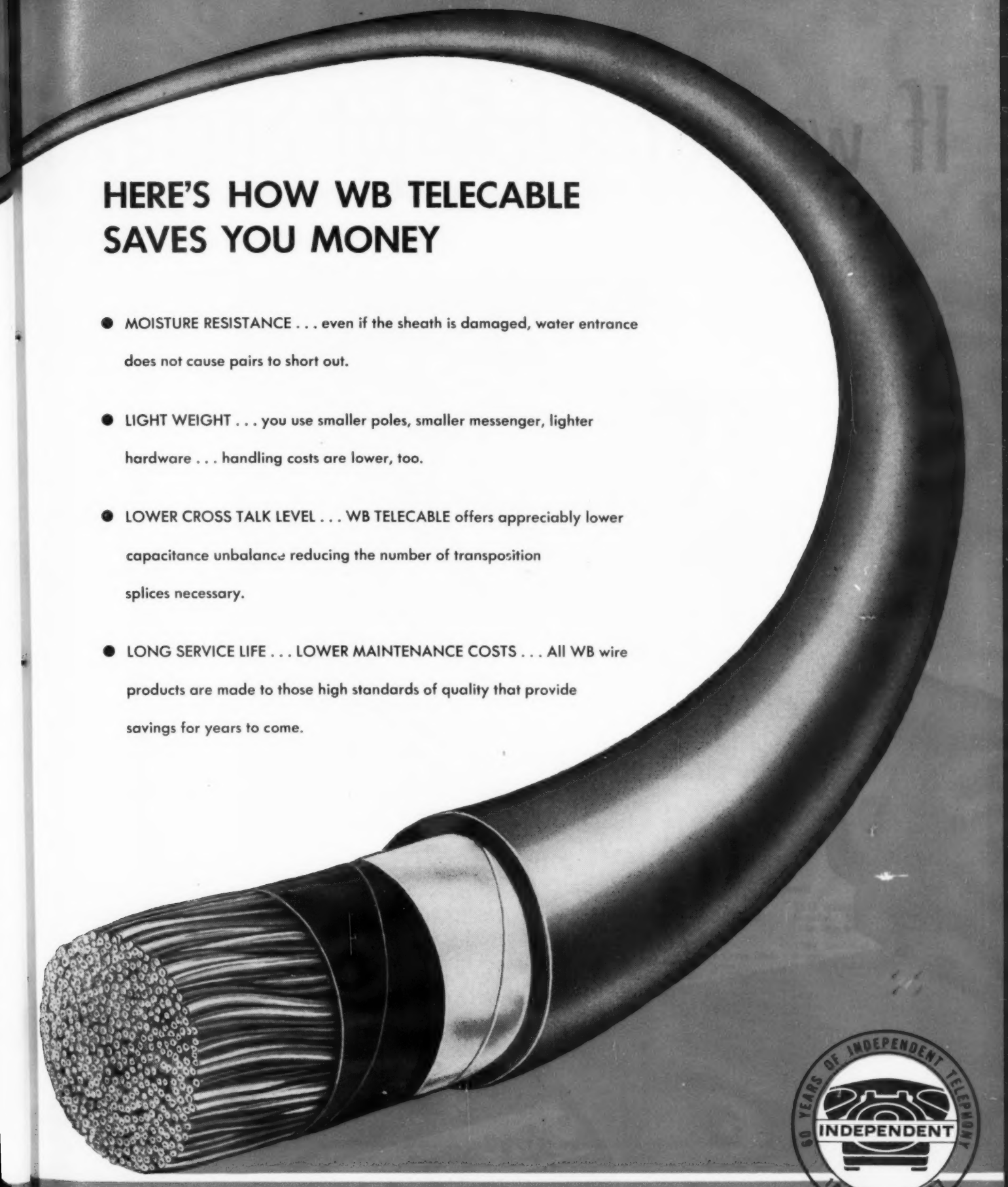

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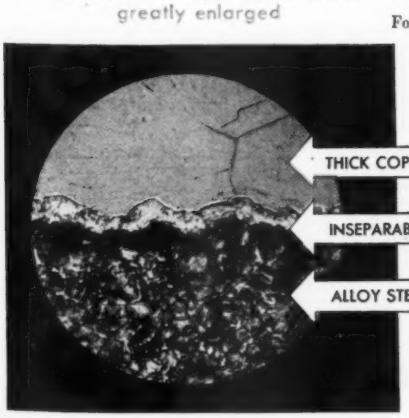

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ADVENTURESOME SPIRIT. An interesting footnote to telephone history appeared in a recent issue of American Telephone & Telegraph Co.'s *Long Lines* magazine. The story:

"It seems that Long Branch, N. J., can take a bow as the scene of the first actual 'ship-to-shore' telephone service. This was in 1896 long before practical radio was more than a thought in the minds of inventors.

"In January of that year, the liner *St. Paul*, a big ship for those days, had stranded on a sand bar 1,200 yards off Long Branch. Some enterprising local residents gathered up a lot of wire, rowed out to the ship, payed out the wire behind them, and rigged up a telephone aboard. It was connected to the Long Branch telephone exchange and a unique telephone number was born—'Atlantic Ocean 1.'

"People from all over called up 'Atlantic Ocean 1' for the novelty of talking with any crew member who would answer during the boredom of just sitting there for 11 days off shore.

"Then came high tides, plus a strong west wind, and the *St. Paul* floated and steamed away. The line snapped (it was thriftily retrieved as salvage, by the way) and 'Atlantic Ocean 1' vanished from telephone service."

•

INCOMMUNICADO. The maiden voyage of the cruise ship Aquarama on the Cleveland-Detroit run was anything but auspicious, reports the *Associated Press.*

Ship-to-shore telephones weren't working, somebody forgot to stock the ship with cigarettes, foghorns were too loud—and an apprentice bartender put sweet vermouth in the martinis.

•

VALLEY OF THE MOON. "'Ow's that agayn?" The British voice floated in recently to a Spokane (Wash.) mobile telephone operator, reports *Talk*, bill insert of the Pacific Telephone & Telegraph Co. A bit of two-way radio talk determined that the British major was trying to contact his commanding officer, the Britishers being halfway around the world in Kenya Colony, Africa.

The major was a trifle miffed at finding the operator on a British army radio channel until she explained to him that sunspots could be bouncing his voice a little.

"Oh?" inquired the major. "Well 'oi say. Just where might Spokayne be?"

•

PROPER PRESCRIPTION. More than 300 doctors and dentists in Syracuse, N. Y., unable to depart for a medical society clambake because of constant telephone calls from patients, finally shuffled off to the bake with a telephone switchboard and operator in tow, reports the Associated Press.

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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1904

November 2, 1957

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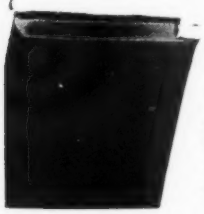

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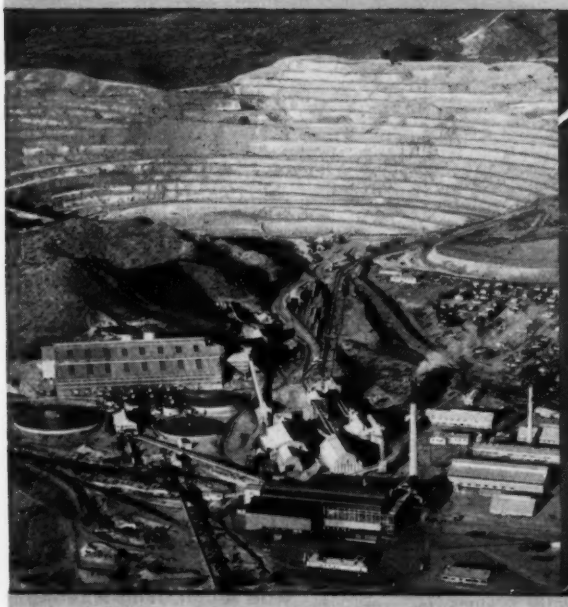

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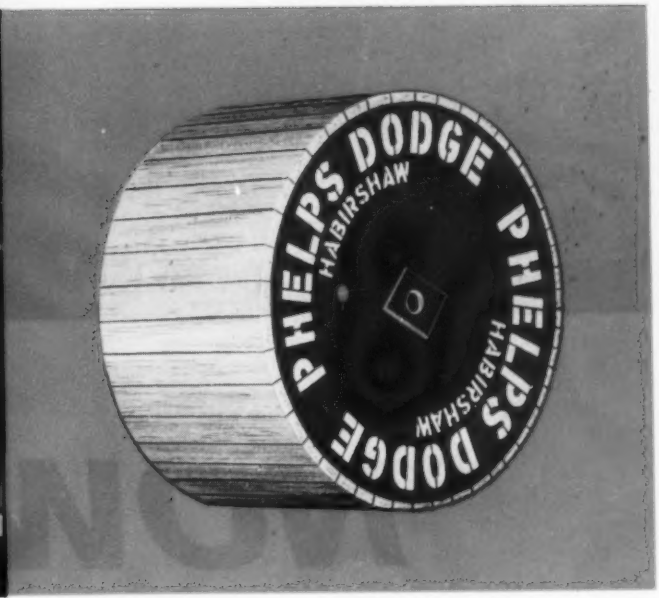

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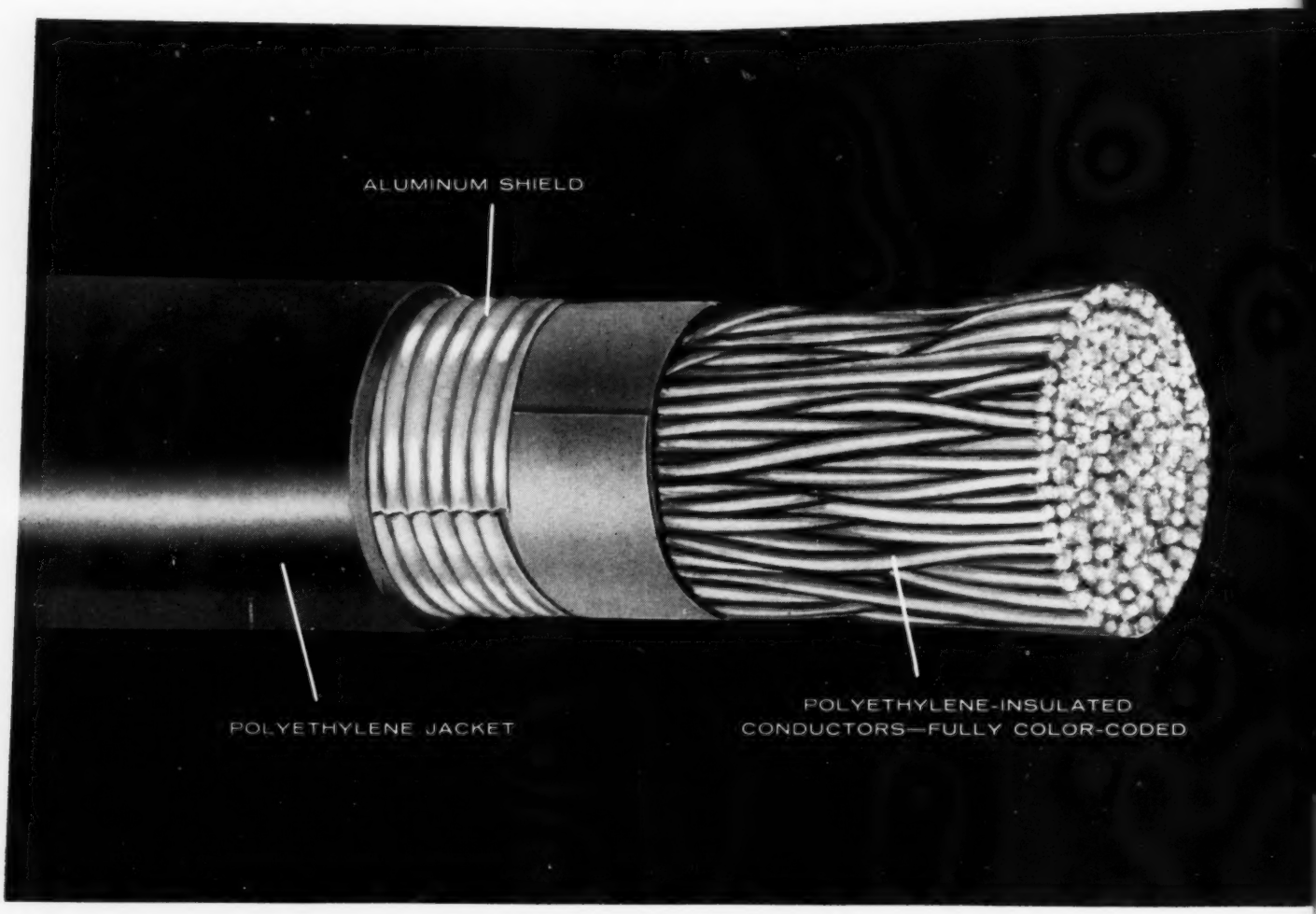

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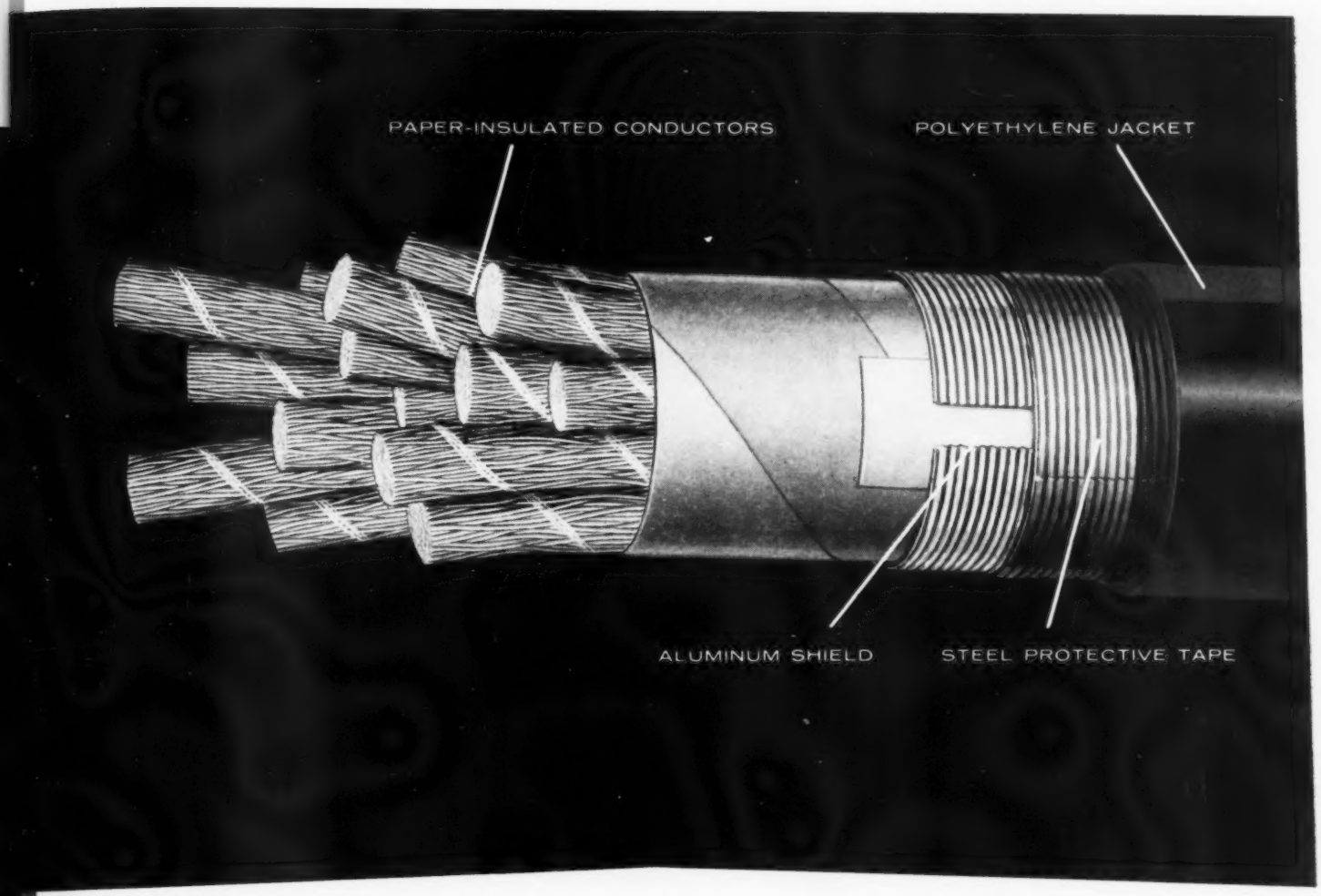

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Justice Department uses high pressure on both FCC and Bell System to keep telephone companies out of lease-maintenance mobile radio-telephone equipment service. Welch raises some questions which should be of prime interest to Justice attorneys and FCC.

IT LOOKS like we are going to have a new attorney general within a few days and it is a safe bet that some Bell officials are wondering if it is going to make a difference in a matter of much concern to them. In fact, it is a matter of much concern to the entire telephone industry. That is the Justice Department's rather forthright intervention in a case now pending before the Federal Communications Commission (FCC) in which the Bell System has filed tariffs to cover lease maintenance of private mobile radio-telephone systems.

Regular readers of this department will recall previous discussion of this case. The latest move (as these lines were written at any rate) came in the form of a letter from the Justice Department still functioning under Attorney General Herbert Brownell Jr., who has announced his resignation effective within the next few days. President Eisenhower has already designated Brownell's first assistant, William P. Rogers, to succeed as the cabinet officer in charge of the Justice Department.

The Justice Department's most recent letter to the FCC on the mobile radio-telephone tariff case is not a very diplomatic communication. In fact, a more irreverent observer might say that it smacks just a little bit of high pressure and strong arming by a cabinet agency seeking to bulldoze a regulatory commission. It is reported to be the product of two lady attorneys in the Justice Department—Margaret Brass and Norah Taranto.

In a word, this Justice Department letter seeks to put the pressure on both the FCC and Bell System to keep the telephone companies out of the newly developing lease-maintenance mobile radio equipment service. This writer does not pretend to know just how closely either Mr. Brownell or Mr. Rogers interested themselves in this particular case, among the many thousands being handled by the Justice Department. But, it is an important case which might well affect the future scope of telephone industry operations. So, for that reason, if there is even a minute change in the ideological psychology of the Justice Department as a result of changing the guard from Brownell to Rogers, the telephone industry will be watching closely.

In its letter, filed on Oct. 3, the Justice Department (opposing the filing of tariffs for such lease-maintenance service by the Bell System) threatened to ask the federal district court to reopen the "consent decree" under which antitrust proceedings against Bell System relations with Western Electric Co. were terminated.

Justice interprets that decree as preventing the Bell System from converting what it regards as a private business (of manufacturing and servicing mobile radio equipment) into a common carrier business by the filing of tariffs with the FCC. It, therefore, takes the position that (1) the consent decree bars the entry of Bell System companies into this business field; (2) the FCC cannot subject to public rate regulation a business which already is subject to antitrust law enforcement; (3) the FCC has no statutory jurisdiction over the proposed operations in any event.

The telephone industry takes the position that competition would be lessened, not increased, by barring telephone companies from the mobile radio field. Such was the gist of the answers filed by the American Telephone & Telegraph Co. last month, supplemented by a reply by the United States Independent Telephone Association on behalf of Independent companies. The Justice Department now threatens to take the whole matter back to the federal district court in which the "consent decree" was entered in January, 1956, but it openly hints that it will drop the whole matter if the telephone companies withdraw their proposed tariff filings, or if the FCC should reject them. The department's recent statement pointed out that the court has retained jurisdiction over the decree "for a judicial construction of the final judgment."

Justice claims it would be "under an obligation" to seek clarification of any interpretation by FCC conflicting with its own view. It is not believed likely that telephone companies will give way to this attack in view of the industry's firm position that it has always rendered private line service since the beginning of telephony and should not be ousted from this field simply because of new operating techniques introduced through recent microwave radio arts. There is little attempt in the Justice Department's letter to disguise the high pressure nature of its communication. "Should the commission fail to agree with us" on the impact of the decree, says the report by the two lady attorneys in the Justice Department, the matter would be placed before the federal court.

Further throwing the department's weight around, the Justice Department's letter stated that "great weight" should be given to Justice's view by the FCC. But the commission will be given a chance to save face if it knuckles under by agreeing with the Justice Department. That is the only interpretation that can be made of the concluding statement in the depart-

ment's letter: "However, it may be that resort to the court may be premature at this time since the tariff has not been approved by the commission."

Chief FCC examiner, Col. James D. Cunningham, has broadened this case by approving interventions for a number of new parties, including Gordon F. Bennett, Inc. of Buffalo, N. Y.; Milborn Electric Co. of Freeport, N. Y.; Dechant Electrical Service of Belleville, Ill.; Wilson Two-Way Radio Communications of McAllen, Tex.; Two-Way Radio Engineers, Inc. of Roxbury, Mass., and Communications & Electronics Service, Inc. of Jackson, Mich. All of these are companies active in the mobile radio installation and equipment field.

The present status of the case is indefinite. The FCC has to dispose of a number of procedural matters before going ahead with hearings which have been postponed indefinitely.

Broader Aspects of Case

There is far more to this mobile radio-telephone tariff filing case than meets the eye at first glance. The FCC is being called on to decide a fundamentally important policy question in a number of areas. First, and most obvious, is the anti-trust argument raised by the Justice Department. The anti-trust policy of the federal government, as announced in the old Sherman Act and subsequently in the Clayton Act, with various amendments through the years, is mainly to prevent unlawful restraint of trade by monopolistic practices designed to thwart ordinary business competition.

Now, it probably is a fact that the telephone companies, because of their vast experience and existing installations, would be able not only to do a good job of mobile radio-telephone service, but probably could do such a good job as to outshine a good bit of competition. It is conceivable as a result of this strong position, in which the telephone industry finds itself, that some competition by other would-be service organizations, seeking to promote their own mobile radio-telephone equipment arrangements could not go very far. Some might not even get off the ground.

On the other hand, the Bell System has already made the argument that competition will not be encouraged by arbitrarily disqualifying one entire group of would-be competitors; namely, telephone companies. And, if it be admitted that the telephone industry is in such a strong position that its competition will outshine or prevail over other rivals for this class of service, the Justice Department finds itself in a position of arguing that the strongest competitor should be barred from the field in order to make business available for the less competent competitors. This is a sort of "survival of the weakest" form of argument. And, it immediately raises the question of public interest. Is not the public entitled to the best mobile radio-telephone service available, or at least the one so attractively packaged that it will persuade a larger volume of patronage as a matter of free preference?

Of course, this is a theoretical argument based on debatable assumptions. Many of the independent service organizations intervening in this mobile radio filing case would put up plenty of argument that they are prepared to give just as good if not better service to their clients, as the Bell System, or any other telephone company. The point to be remembered, however, is that *telephone companies are not trying to bar others from this field of business.* It is apparently the others which are trying to bar telephone companies! The inference is that the "others" would rather knock out competition by legal restraint, than meet it on equal economic grounds in the open market.

The Merchandising Angle

Somewhat analogous to the complaints which independent manufacturers and mobile radio service people make against Bell System is the old argument which has recurrently vexed gas and electric utilities. These utilities, in former years, discovered that they could improve their business opportunity by selling gas and electric appliances. They were primarily interested, of course, in promoting greater use of their service. But, in the sale of these appliances they not only ran into competition with independent appliance dealers, but also found themselves in a preferred position. Many gas and electric customers coming into the utility's offices to pay bills found appliances displayed and demonstrated there. Utility companies could give very liberal terms which could be paid in instalments on monthly gas and electric bills. And, it is not surprising that the independent appliance dealers felt very much imposed upon. They thought the gas and electric utilities should confine themselves to gas and electric service, and nothing more. So great were the differences of viewpoint, that opposition to utility company merchandising of appliances became organized. In some states, there were campaigns for legislation to prohibit utilities from selling appliances and several laws of this sort were actually enacted. The courts generally held, however, that there were no constitutional bars against utility companies engaged in selling or servicing appliances as a means of furthering the business for which they had been incorporated.

Since this early controversy, a good many electric companies, and quite a few gas companies, have gone out of the appliance selling business and have cooperated with local dealers. But, quite a few find it to their advantage to stay in direct appliance merchandising.

Of course, the analogy between such appliances and mobile radio-telephone lease-maintenance breaks down when you consider the fact that one is the outright sale of a product to be owned by the customer. Telephone companies, however, are selling or trying to sell a service. Nevertheless, they maintain that it is an adjunct of their regular telephone service obligation and that they should not be barred from it entirely simply to make sure that some other service organization will be able to make a few dollars.

Several gas pipeline and other utility companies seem to be among those seeking to bar telephone companies from entering the mobile radio-telephone lease-maintenance field. It would be interesting to speculate just what would be their reaction if the respective positions of the two utility groups were reversed.

Suppose, for example, the telephone industry were to decide that it would rather not depend on the electric companies for power supply, or on the local gas utilities for heating supply. Suppose they said: "We have to be sure of an adequate electric and heating supply at our central stations at all times. To avoid as much as possible any breakdown or outages due to storms or other defects of electric and heating equipment, we must have these facilities under our own control."

Suppose, as a result, the Bell System ordered Western Electric Co. and the Independent companies asked the Independent manufacturers to design some practical standardized central heating and generating equipment which could be manufactured and installed in all telephone company properties! We can easily imagine the cries of anguish which would go up from the gas and electric utilities under such circumstances. Yet, those are the arguments (in reverse) which some of the gas pipeline and power companies advance in criticism of direct operation of mobile radio-telephone service by telephone companies.

The Regulatory Aspects

The Justice Department hit the nail right on the finger when it referred to the fact that the independent mobile radio-telephone services are private

(Please turn to page 45)

REA Approves Telephone Loans in 11 States

The Rural Electrification Administration for the two-week period Oct. 7-18 approved telephone loans totaling $5,001,000 for borrowers in Alabama, Kansas, Kentucky, Louisiana, Massachusetts, Minnesota, Missouri, New York, Pennsylvania, Tennessee and Wyoming, the U. S. Department of Agriculture has announced. Initial service to some 3,800 farm and other rural subscribers is provided, plus improved service for existing subscribers and extensive system improvements.

Butler (Ala.) Telephone Co., $94,000, second loan (Oct. 7). The funds will enable the company to extend service to 151 rural subscribers.

The present and a prior REA loan, totaling $384,000, will make possible new and improved service to 808 subscribers. The system will consist of 161 miles of line and the Butler automatic exchange. The borrower plans to provide PBX facilities to serve the Marathon Southern Corp.

B. W. Barber is president and manager of the Butler Telephone Co.

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Sedgwick Telephone Co., Dodge City, Kan.; $97,000, second loan (Oct. 7). The borrower will use this loan, supplementing a previous loan of $560,000, to furnish new and improved service to 1,528 rural subscribers. The completed system will have exchanges at Argonia, Conway Springs, Norwich and Riverdale.

Francis H. Gould is president and manager of the Sedgwick Telephone Co.

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West Kentucky Rural Telephone Cooperative Corp., Mayfield; $535,000, third loan (Oct. 9).

The loan will finance improved service for 305 existing subscribers and initial service for 452 families now without telephones.

As a nucleus for this new service, the borrower has acquired with general funds the Puryear (Tenn.) Telephone Co.; the Harris Grove Telephone Co.; and the Pilot Oak Telephone Co. Funds are included in the loan to reimburse the borrower for the first two acquisitions, and to rehabilitate and integrate the three companies into the borrower's system. There is no service at present in the Pilot Oak area.

New automatic offices are scheduled at Puryear and Pilot Oak. Harris Grove subscribers will be served from the borrower's present Lynn Grove exchange.

The present and two prior REA loans, totaling $2,354,000, will enable the borrower to provide new and improved service for 5,487 subscribers. Ten exchanges, provided for in the borrower's first REA loan, are in operation, serving about 1,900 subscribers; four others included in the second loan are in process of construction.

L. W. Murdock is the president of West Kentucky Rural Telephone Cooperative Corp. W. L. Parr is manager.

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Prattsburg (N. Y.) Telephone Company, Inc., $584,000, first loan (Oct. 9).

The loan will complete conversion of the existing system to automatic and provide facilities to serve 443 rural subscribers now without telephones. The borrower now serves 1,097 subscribers through automatic exchanges at Prattsburgh, Pulteney and Urbana; a temporary automatic arrangement at Hector and magneto facilities at Burdett.

The borrower will serve the Hector-Burdett area from a new automatic central office in Burdett. Funds are also included for additions and changes in the Prattsburg and Pulteney exchange areas.

A portion of the loan will refinance existing indebtedness incurred for previously approved system improvements, and reimburse borrower for cost of construction now in progress.

Herman H. Wagner is president and manager of the Prattsburg Telephone Co.

•

North Penn Telephone Co., Mansfield, Pa.; $1,110,000, first loan, to improve and expand rural telephone service (Oct. 10).

The borrower will use the loan to improve service for its present 1,150 subscribers and to provide initial service for 740 rural subscribers. The company now furnishes dial service through its Millerton exchange, and magneto service through Bentley Creek, East Smithfield, Mainesburg, Mosherville and Roseville.

New automatic central offices are scheduled at East Smithfield and Roseville. The automatic facilities at Millerton will be expanded and retained in place and the Bentley Creek exchange, which is in process of conversion to automatic, will be expanded and completed. The Mainesburg and Mosherville exchanges will be eliminated and subscribers in those communities will be served from the four automatic exchanges.

The borrower recently converted the Millerton exchange to automatic operation. The loan will refinance indebtedness incurred in converting this exchange and modernizing the Bentley Creek exchange, and reimburse the company for construction performed, subject to REA approval, while this loan was pending.

Herman H. Wagner is president and manager of the North Penn Telephone Co.

•

Elizabeth (La.) Telephone Co.; $67,000, second loan (Oct. 11).

The loan will enable the borrower to provide facilities to serve 118 new rural subscribers. The present and a prior loan totaling $435,000, will enable the borrower to furnish new and improved service for 987 subscribers.

Mrs. Helen Sigler Prevey is president and manager of the Elizabeth Telephone Co.

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Minnesota Central Telephone Co. (formerly the Hector (Minn.) Telephone Co.); $291,000, fourth loan (Oct. 10).

The borrower plans to use the loan to serve additional territory. New and improved service will be provided to 595 rural families.

The borrower has acquired the properties of the Commercial Telephone Co. at Belgrade consisting of an automatic central office at Elrosa and magneto facilities at Belgrade, serving 325 subscribers and 103 switchers.

(Please turn to page 46)

The actual cost of units of property in place should include all component parts along with the cost of labor to place them in the plant.

Design and Operation of Small Companies

By R. J. POLLOCK

Part 3
Accounting Practices

THE AVERAGE telephone company employe places far too little emphasis on the necessity of accurate and complete accounting records. That job is usually thought to be one for the white-collar people in the front office and is widely treated as such by the plant field forces.

Actually, the accounting personnel have a big job in trying to decipher plant field reports so that they can be converted into records that will reflect actual conditions. They cannot perform this work with a reasonable degree of accuracy unless good data is submitted to them.

It follows that simple detailed instructions should be given to the field employes showing why the correct data is required so that all reporting will be accurate. It is not possible for all employes, regardless of their ability to perform mechanical and technical duties, to submit correct reports covering charges such as material and labor, if the methods and practices are not set up so that they are easily understandable by all average personnel.

Failure to set up a simple routine will result in book values that are grossly in error. Many cross-checks can be made, such as comparing the material and supply accounts with the actual field reports in any particular job or exchange and, as an example, it is not unusual to find that more crossarms have been charged out to the job than were originally in stock. Unfortunately, this type of check cannot be made in such detail on all labor and some other expenditures. Reporting the wrong code for both material and labor can result, if we go to an extreme example, in a pole in the submarine cable account, or vice versa.

These and similar errors can occur if the accounting personnel is not properly trained to detect such incorrect data which will result in a set of books that could conceivably reflect a good operating condition when actually the reverse is true.

The above conditions as they pertain to the plant accounts are by no means characteristic to only that part of the complete accounting picture. The various codes covering the commercial and traffic operations, while not as readily susceptible to error, are in the same category as far as accuracy is concerned.

In the case of the commercial department, the information submitted covering customer records for billing and collections will, if not correct, result in overpayments and the resulting refunds, which will necessitate additional unnecessary expense to the company. Lost revenue, because of incomplete individual customer accounts, can also have a material bearing on the income of any exchange.

In most cases, if an error exists in any individual customer account, it is not evident until a request is received to change or add to the existing service. The effort required to collect the money if underbilling occurred is extremely difficult. However, if an overpayment condition exists, and especially if it is found by the customer, a refund is in order along with an appropriate interest charge.

There is a question whether or not it would be economical from an actual cost standpoint to make periodic checks to determine if the customer billing is in accordance with the actual service being given. However, the magnitude of the condition if it exists cannot be determined without such a check. Representative examples which have occurred in the past in various companies indicate that the problem is by no means of an insignificant nature.

Toll ticketing with respect to timing and rates is frequently challenged by toll users after billing has been issued by the accounting department. In connection with automatic ticketing, the error, if any, can usually be traced to the customer but, if it is done manually by a traffic employe, it might be impossible to settle the dispute to the satisfaction of the customer.

The accounting department has a number of other duties in connection with the operation of a company which require detailed work, such as financial statements, disbursement reports, payrolls, and subscriber and stockholder records. The data used in performing these and all other duties in the department must be in correct and legible

form in order to have a complete and accurate record of the company.

The subscriber records as set up by the revenue accounting department, primarily used for customer billing purposes, are of vital importance in a rehabilitation program, especially in those cases where a conversion is contemplated.

Except in the case of a very small company which does not have the equipment, a special run of the subscriber Addressograph plates will supply the conversion forces with the name and telephone number of all customers being supplied with service from the exchange switchboard. This list, when checked with the plant and commercial records and compared with that secured by an actual field check in connection with station rewiring and regrouping for the conversion, will eliminate possible errors as far as the connected main stations are concerned.

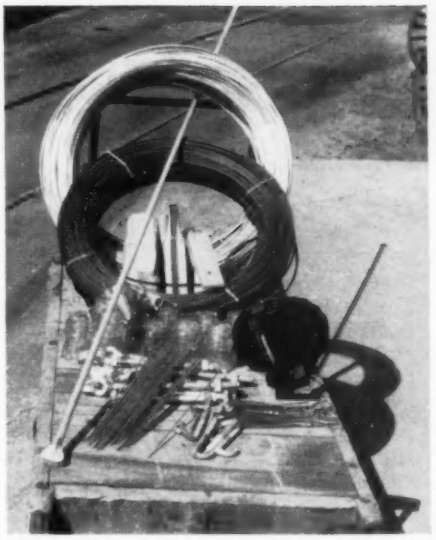
Past experience indicates that unbilled equipment may be found in service which has not been included in the current customer billing. It may not be feasible to attempt to collect the amount due for the additional service involved, but it will result in additional revenue when the error is discovered.

The size of the operating company will determine whether or not the company accounting is done by employes hired for that purpose, or by any of the numerous public accounting firms which have been organized to handle the work of the smaller companies. These firms are well versed in accounting procedures, which will meet the requirement of the regulatory commissions, but they cannot set up accurate accounts unless reliable data is submitted to them.

The reasons why records should be accurate are usually evident to management, especially in connection with rate revisions and it is probable that such procedure could be delayed if detailed correct accounts were studied far in advance.

The breakdown of the various types of plant and associated operating costs will determine if the operation is out of line, compared to standards set by other companies operating under similar circumstances. It is not enough to examine costs on the per station basis alone, since there may be compensating factors which, when totaled, would reflect average performance.

The study of costs on the individual account basis, in some cases, will reveal conditions which are out of line when compared to standard practices, or will show that unnecessary expenses are being incurred. If steps are taken to correct these undesirable conditions



All material leaving the stockroom must ultimately end up as plant in place in proper accounting records.

in all phases of the operation, it is possible that the company's earnings could be increased to a point where a better return is realized on the total investment.

Accounting methods set up to differentiate between urban and rural operations also would show the difference in the earning capacity between the two types of plant. This would permit studies to be made which could lead to adoption of more economical practices, which again would affect the company's earnings.

Generally, rural plant does not have the earning capacity of urban property and the problem here is to operate it on the most economical basis. With detailed records, a continuing study can be carried out so that ultimate savings can be made.

However, the results of such studies must be conveyed to the proper operating personnel if the procedure is to be successful.

Many other accounts, such as automotive equipment, repair shops, electrical energy and minor material, generally, if studied closely, will show where definite saving can be made with little, or no additional effort, other than ordinary supervision.

The maintenance accounts, for many companies, are usually a "catch-all," since they are the most likely place to charge unproductive time, and a monthly check will show that at times they vary considerably for no apparent reason.

This could be due to weather conditions which would justify an increase and, on the other hand, it might indicate sub-standard operations. This latter condition would necessitate corrective measures which could not be undertaken if the matter had not been revealed through suitable accounting records.

An accounting method which carries detailed material stock records will save considerable sums of money if they are set up to facilitate checks which can be made with a minimum of effort. They should not only be specific on major items, but also on the minor ones, such as small bolts, screws and even drop wire sleeves.

A check of the ground surface below a terminal pole at the junction point with open wire will usually show some material which was purchased to be placed in a telephone plant, but did not reach that destination.

A tool account carrying detailed entries of the various tools, both large and small, used in construction and operation can be set up to show many of the unnecessary losses which take place.

In addition to the economies realized, a study could reveal unsafe conditions which might have a direct bearing on the employe accident rate, which can be very costly if they are lost-time accidents and when you consider the effect they have on insurance premiums.

The change from the present accounting procedure covering station and drop wire codes to the cradle-to-grave method can be greatly simplified if the existing codes reflect actual field conditions. This is especially true in small plants where excessive drop wire has been placed instead of open wire.

A good accounting system is also invaluable for tax purposes, not only from the federal and state standpoint, but also from the standpoint of municipalities.

Independent companies, of course, want to increase their portion of the nation's toll revenues received under toll settlement agreements, which requires that detailed accounts be maintained to show the actual plant used solely for toll purposes.

The smaller companies may not at this time attach too much significance to this problem because their toll revenue is a minor figure compared with their over-all earnings. This may be due to not having any plant which can be classed as toll plant, but consideration should be given to exchange plant which is used for toll purposes in connection with any long distance call from a subscriber's telephone. That portion of the switchboard used for toll purposes would also enter the picture and, for that matter, even part of the building and lot constitutes part of the toll investment.

Admittedly, it would require a very fine line, if it could be drawn, to show the plant which could actually be

classed as toll plant, but it is used as such in connection with any toll call.

The possibility of a complete change in the present thinking covering toll settlements is very probable due to the new toll development commonly known as DDD (Direct Distance Dialing). It appears to the writer that it will ultimately have the same impact on toll revenues of all telephone companies as it did on those of the grocery, drug, and hardware businesses when they instituted the serve-yourself merchandising plan.

This thought may, on the surface, appear to be "far-fetched," but when we analyze it from a psychological basis the magnitude of the possibility begins to take form. The resulting increase in toll usage for business purposes may not be phenomenal, but in the case of individuals on the residence telephone basis, the increase should be unique.

In an exchange equipped to supply DDD service, the customer has the facilities to dial any distant station on the station-to-station basis without operator assistance. This procedure tends to eliminate the reluctance on the part of a customer to place a toll call because it is costing additional money. The simplicity of the operation should encourage more frequent use of toll service in the future in that it does not require any more effort than that of a local call.

Further, the cost of the call will not appear until the monthly telephone bill is received and should, therefore, have the same effect as the various hidden taxes which are paid on all commodities and other services.

Incidentally, the plan could have a direct effect on the customer survey discussed in the first article. Given good transportation facilities, and/or highways, to and from the business center of the area, many residences could be changed to rural or small town locations. This would directly affect the entire plant in the smaller community to a point where it could be considerably undersized.

Given sufficient time, the plan should produce additional toll business, the magnitude of which cannot be visualized at this time.

The impact on the smaller exchange would appear to be negligible if we consider only the customers in the area being served. However, when those in other exchanges in the same state and other states, who might have reasons to communicate with the local customers, are included, the magnitude of the possibilities is evident.

In future chapters Direct Distance Dialing will be discussed as it pertains to the central office and tributary toll circuits required to facilitate participation in this new development. The above discussion was brought out here merely to emphasize the necessity of accurate accounting records so that toll compensation, in accordance with the actual plant involved along with the originating and terminating factors necessary to complete any toll call, can be fully realized.

Again, it may appear that the matter of employment of new personnel does not have any bearing in a discussion of accounting. It nevertheless has a definite effect if we consider the ultimate possibilities of the new addition to the forces.

If the new employe is hired with the thought in mind that ultimately he or she may be advanced to the point

"Hey, Joe! Coffee break!"

where they are contributing reports that reflect expenditures that will be entered on the books of the company, then the ability of that individual as it pertains to accuracy, in so-called paper work, deserves more than passing attention.

The expense to the company of training a new employe even for minor jobs, be they in the commercial, plant or traffic departments, is by no means a small item. It follows that if that employe is hired with the thought in mind that he has abilities in excess of those of the original job he can be considered as a future asset rather than a liability. This is especially true in those cases where the forces are represented by a union.

The above discussions would suggest that a handbook showing all telephone accounts be made available to all employes responsible for the preparation of daily material and labor records. This could be drawn up from the numerous articles in this journal and FCC manuals but the cost would be high.

Some state telephone associations have a book of this type designed for the smaller company which should be of material assistance. It follows that in order to properly report the daily expenditures, a material and labor form will be necessary.

It should show the employe's name, date work is done, exchange location, company truck number and space for the various materials used during the day, along with the labor to place it in plant, all of which should be broken down to show the various codes to which they are chargeable, including the truck mileage.

This report for economy reasons need not be an elaborate printed form since a mimeographed sheet would serve the same purpose. However, after the form has been set up and actual use shows the specific information needed on it, such as horizontal and vertical divisions which will segregate the various codes, it can be printed in tablet form at a lesser cost.

A common fault encountered in the preparation of a report of this kind is that the exchange repairman or the crew foreman in many small companies probably does not keep records during the day which will actually show how the material and labor was expended. At the end of the day the management of a small company relies on his memory to report the day's expenditures. This can result in omissions which could be costly to the company even when considered on a daily basis.

If a proper check is maintained, covering the material turned over to them for the day's work or the complete job, a recheck can be made which might eliminate some of the errors. It will, however, not show up small material or improper labor charges on both the capital and maintenance accounts, and, therefore, the employe must be instructed in detail and accurately checked periodically before his reports are accepted.

This check should be in detail and done by a competent older employe, who should explain in great detail why the check is being made. Failure to do so will result in laxity due to carelessness or other reasons, which ultimately will be reflected in the accuracy of the accounting codes.

The emphasis placed on training all employes in all departments on the proper reporting of material, labor and all other expenditures will, in the end, pay handsome dividends.

Accounting machines, if used, will record only that information which is supplied to them, so it is important that the original information be checked for accuracy before it is fed into the machines.

(To Be Continued)

TELEPHONY'S ELECTRONICS SECTION

BY HAROLD B. McKAY, ELECTRONICS EDITOR

SELECTIVE CALLING

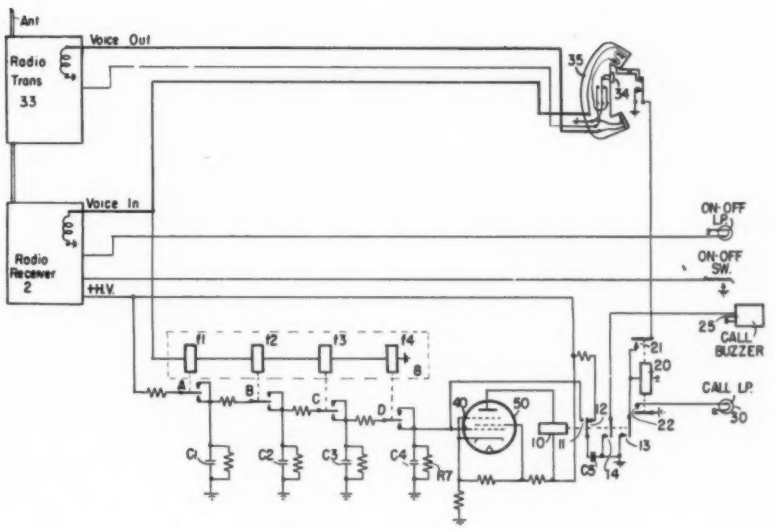
A NUMBER of different methods for calling mobile radio stations have been developed, and new ones are constantly being tried. A recent patent, No. 2,794,972, is typical of these. Invented by Robert Dimmer and assigned to General Telephone Laboratories, it is of interest because of the combination of relay and electronic techniques which are now appearing in the telephone industry.

The accompanying illustration shows four tuned relays, f1, f2, f3 and f4. These are set to respond only on certain frequencies, and each mobile unit would have its own combination of relays and frequencies. The operator at the central station would have facilities for multi-frequency key pulsing.

When the right combination of frequencies is received, the four tuned relays will operate. This will cause the +H.V. (high voltage) to charge the condensers C1, C2, C3, and C4. Each will take a charge and then "dump" this charge to the next condenser to the right. The resistance in parallel with each condenser is to discharge it and make it ready for another call, in the event that only some of the relays operate (as when a different station is being called).

The last condenser, C4, applies its power to the grid of the vacuum tube 40. This tube is normally near cut-off point, but the positive charge from C4 makes it conduct momentarily. The current flow through the tube will then operate relay 10, which operates the call buzzer 25 and also operates relay 20, which in turn lights the call lamp.

Condenser C5 normally is in a charged condition, receiving high voltage through contact 12 of relay 10. When this relay operates, the condenser with its charge is transferred to contact 11. This adds the charge on C5 to the charge on C4, thus electronically holds the relay operated for a longer time than C4 alone would. This then is an example of how to achieve a slow release relay effect electronically. When relay 10 releases the buzzer will stop.



Patent No. 2,794,974

Relay 20 remains operated, locked to the contact on the handset hookswitch. Thus the lamp will remain lighted. The driver of the vehicle, if away at the time the buzzer sounded, will know by the lighted lamp that a call has been placed to his car. Lifting the handset releases relay 20 and extinguishes the lamp.

SPEECH BRIGHTENER

IF YOU have sometimes thought that another person's voice sounded like so much noise, you guessed right. Human speech, it seems, is made up of "tonal" sounds which are of comparatively long duration and steady value, and other rapidly changing bursts of sound which are similar to plain old-fashioned noise. Both the tonal components and the noise-like parts of speech may be on the same frequency, so cannot be separated easily.

However, when noise is present on a line over which speech is traveling, it spoils the talk because the noise components of the speech and the noise on the line are the same kind of sounds. Ordinarily, anything which would amplify one would also amplify the other, as well as amplifying the tonal components.

This in a sense is like looking through a telescope: things are magnified, but are not made any clearer. Now an invention (Patent No. 2,799,734) has been made which will selectively increase the amplification of voice components which resemble noise. This would have the effect of

XUM

giving more power to certain consonants without changing other parts of the speech. This would have the effect of brightening the speech and making it more easily understood through noise.

The invention operates by taking a portion of the speech power in a circuit, rectifying it, then filtering it to accept voltage changes that occur in a low frequency region, perhaps from 5 to 150 cycles per second, where most of the noise-like components lie. Thus each rapidly changing part of speech would produce a voltage change which would be applied to a gain control circuit in an amplifier. This would give an added boost to these parts of speech before they go out on the line, and thus give them an advantage over the noise.

The patent was issued to Glen Camp and assigned to Melpar, Inc.

POWER LINE CARRIER

A NEW power line carrier circular has been issued by the Lynch Carrier Systems of 695 Bryant St., San Francisco. It describes the B-60PL system which can be used to put as many as 12 communications channels on a three-phase power line. Each phase can be equipped with four toll quality circuits for voice or telemeter.

The B-60PL is equipped with compandors, and is said to give satisfactory service on very noisy power lines. Standard types of capacitor coupling stacks and wave traps are used, and special equipment is not required to couple to power lines. The system uses single side band suppressed carrier operation and provides talking paths of 300 to 3,000 cycles.

The frequency shift keying system will accommodate 20-cycle ringing or 14 pulses per second dial signals. Full duplex operation is used so that voice operated relays and push to talk handsets are not required. A nominal over-all loop gain of 44 db is possible with the system, and repeaters are available for bridging carrier channels around sub-stations, thus covering the entire length of a power line. Way-station takeoffs are possible at any repeater station. The repeaters are of the frequency inverting, or "frogging" type, which eliminates singing caused by external coupling. Individual channel regulators hold the circuit to within ± 2 db for line attenuation changes as great as 25 db.

Lynch also has a new leaflet on voice and carrier frequency repeat coils which can be used for simplex, phantom or impedance matching purposes. You can get copies of these papers by writing to Lynch Carrier at the above address.

STANDING WAVES

A PRINCIPLE objective in almost any transmitting operation is to deliver the goods to the destination. This applies to everything from the mails to electric power. It avails a farmer little to grow a lot of produce if he can't deliver it to the customer, or if the customer sends it back after he gets it.

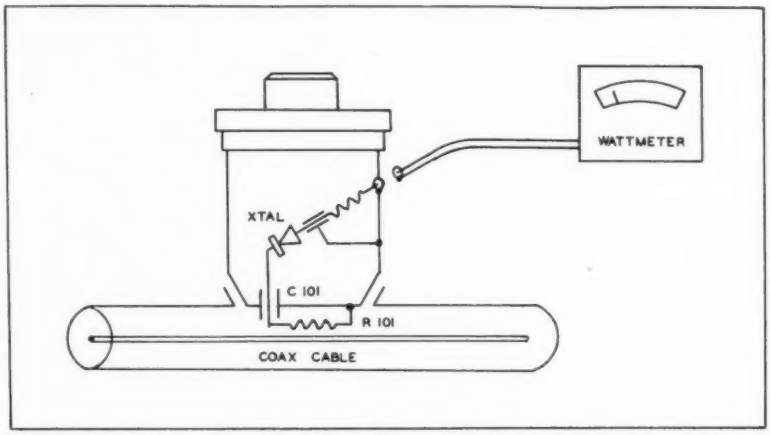
A similar problem arises in electrical transmission. Power, which is generated, be it 60 cycle, voice or microwave, does nobody any good unless it can be delivered to a place where it can be used. This is usually done with wires which connect the source, or generator to the destination or load. Like a capricious customer, the load may accept the power and then send it back to the store, as it were.

When this happens in 60-cycle power systems, the engineers talk about the "power factor" on the line, which is a measure of how much of the delivered power is being used compared to how much is being sent back.

On telephone lines when some of the voice power is rejected at the receiving end and sent back, the result is measured in terms of "return loss."

When a radio or microwave antenna doesn't accept the power sent to it by the transmitting equipment, the comparison between the returned power and the transmitter power is measured as "standing wave ratio."

In each case, the trouble is caused by failure of the load to "match" the transmission line in one fashion or another, or because the load con-



Standing waves on a transmission line can be measured with a directional coupler like this. The tiny loop of wire between C101 and R101 picks up electric and magnetic waves from the coaxial cable. (Drawing by Victor Willard from a Sierra Electronic original.)

tains some reactance instead of being pure resistance. On a power line, this can happen if too many devices are connected up which have a surplus of inductance or capacity. Both inductances and capacitances will take a "charge" on one-half of an ac cycle, and discharge and return the current to the line on the next half cycle.

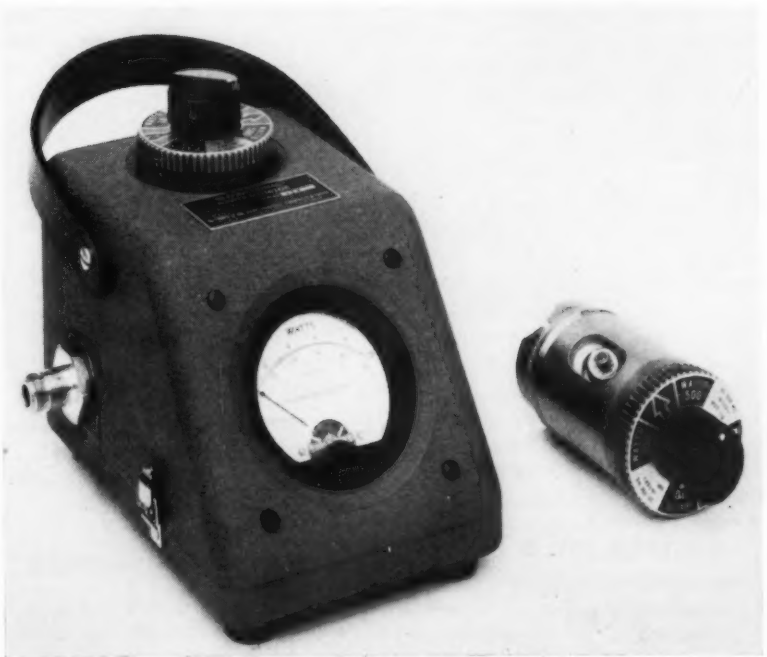
In telephone or radio, if the pair or the transmission line has any discontinuities, such as different size wires spliced together, loading coils, bridging taps, or if the far end is connected to something that is of different impedance than the transmission line, then part of the transmitted power will be rejected and returned to the source.

UNDESIRABLE EFFECT

In different services, this is undesirable for different reasons. In the 60-cycle power business, it is expensive because the power company must generate, transform and deliver power which is returned without being paid for.

The telephone man is concerned because transmitters, sets, wires, repeaters and other facilities must be provided to get power to a receiver, only to have part of it be rejected without being used. An additional trouble bothers him; the returning signal is an echo, which is troublesome in itself, and in addition can cause repeaters to sing and result in increased crosstalk problems.

In radio and microwave, a mismatch between the transmission line and antenna can cause a loss of power. In a mismatch condition, the voltage and current waves going towards the antenna are met by reflected waves returning from it. At points where the two waves are of the same polarity, they add, and at points of opposite polarity they subtract. This result is called standing waves, because these points of high or low voltage along the transmission line will stay in certain spots. They can actually be measured so that by exploring along a line with a meter, points of high and low voltage can be found. The ratio of these is called the voltage standing wave ratio.



The Sierra Electronic Bi-Directional Power Monitor is a directional coupler which will measure both incident and reflected power on a transmission line. A chart furnished with the instrument converts the resulting figures into standing wave ratio.

There can also be points at which the current reaches high and low spots. In large radio transmitters the high amperage can be enough to melt the wire in certain spots while the rest of it stays cool.

POWER LOSS

In addition to loss of power, radiation can occur from a transmission line with standing waves, which may spoil directivity patterns of an antenna and cause radio frequency power to be induced into other structures. Trouble in the final stage of the transmitter can also occur.

There are various methods for measuring standing wave ratios on transmission lines. Wire lines can actually be probed by means of a meter and a pickup coil. Coaxial cable is sometimes probed by means of a slotted line—a section of coaxial cable which has a slot cut lengthwise in it, through which a probe is placed. This method is often used by laboratories.

For permanent use at a radio or microwave installation, meters to measure standing waves are often of more compact design. Some devices of this sort operate on the principle of the directional coupler. This is a device which can discriminate between the waves going in one direction along a cable, and the waves being reflected.

In addition, such an instrument can measure the actual power being put out by the transmitter and the amount of power being reflected back by the antenna. The construction of such an instrument is shown in the accompanying drawing, which is a schematic of the Sierra Electronics Model 164 Power Monitor.

Here, a probe is introduced into a short section of coaxial line. This is a small loop, one end of which is terminated in a resistance and the other end connects to a crystal rectifier and a meter.

When current is flowing in the center conductor of the coaxial cable, some of it is induced into the pick-up loop between C101 and R101. This happens because the current in the coaxial wire sets up a magnetic field which links the probe and causes current to flow in it also. As the current flows in one direction in the cable wire, so it will flow in one direction in the probe. If it reverses direction in one, it will reverse in the other.

VOLTAGE FIELD

The voltage field which is set up by the cable conductor sets up a field in the probe which is electrostatic, not magnetic. That is, it charges the probe wire like a condenser would be charged. The current which arises from this voltage in the probe will travel in both directions—towards the crystal and towards the resistance. This is just like the charged plate of a condenser would furnish voltage off of any edge.

With the current from the electromagnetic (current) field going in one direction, and the current caused by the electrostatic (voltage) field going in both directions, the two will add to each other in one direction and cancel in the other. When the direction of the two waves is such that they go into the resistance, they will cancel out and be dissipated. When they go the other way, they will add and read on the meter.

Thus, it is obvious that this instrument will read the power which is going in one direction only along the cable, even though some power may be going in the opposite direction at the same time. If it is desired to switch the measurement from one direction to another, it is only necessary to turn the probe around.

This instrument will then measure the incident wave, from a transmitter to an antenna, and the reflected wave coming back. Comparing the two will give the standing wave ratio. A chart is furnished with type of instrument, which gives the ratio directly as a function of the two readings. In addition to determining standing wave ratios, the meter can be used to determine the comparison of the modulated and unmodulated carrier power, and thus give an indication of the power in the sidebands.

The Sierra Model 164 is supplied with plug-in units to permit its use on a wide range of frequencies and powers.

ELECTRONIC NOTES

THE longest power line span in the world is the 11,985-foot crossing of the Strait of Messina, in Italy. Slung from 740-foot towers, six cables bring 220 kv power to Sicily. The interesting story of the construction of this span is contained in the September-October issue of CEC Recordings, a publication of the Consolidated Electrodynamics Corp., 300 North Sierra Madre Villa, Pasadena, Cal.

Engineering or management personnel who are interested in modern instrumentation can get on the mailing list for this publication by writing to the public relations department of this firm.

•

SUBMARINE cable fault locations by the pulse echo method are described in the July issue of the *Western Union Technical Review*. It seems that the usual dc testing methods are good for locating the trouble when the copper conductor is in direct contact with sea water, and the fault can be located to within one or two miles.

However, with high resistance faults the location cannot be made with accuracy, so the men on the cable ship cannot easily decide after the first grapple whether to try another location or pick up the cable all the way back to the beach. The pulse echo method is useful for up to 10 miles. This permits a shore station to locate trouble within this distance of the terminal, or permit the ship to "look" ten miles each way into a cable it had lifted aboard. The *Western Union Technical Review* can be obtained for $1.50 per year from the Committee on Technical Publication, Western Union Telegraph Co., 60 Hudson St., New York 13, N. Y.

•

A NEW automatic volume control amplifier has been announced by the Amplifier Corp. of America, 398 Broadway, New York, N. Y. This device, for use on radio transmitters, telephone lines, paging systems, etc., regulates the output volume to within very close limits, even when the input varies widely, thus preventing overmodulation or overloading of lines.

•

A TRANSISTOR tester for measuring the current gain of a wide variety of transistors has been developed by the National Bureau of Standards. A description and circuit diagram of the device is contained in the June issue of the *NBS Technical News Bulletin*. This is obtainable from the Superintendent of Documents, Washington 25, D. C., for 10 cents per copy or $1.00 per year.

MERE humans can't possibly keep up with the rate of "thinking" of an electronic brain. In fact, it has been kind of tough to get mechanical gadgets that could read out the answers as fast as a computer could give them. The fastest mechanical

printers used with computers can read out about 1,200 characters per second, but this isn't fast enough.

So Stromberg-Carlson and Remington-Rand have gotten together on a computer being designed for the U. S. Atomic Energy Commission laboratory at Livermore, Cal. Remington-Rand will produce the computer, and Stromberg-Carlson will develop an "electronic stenographer" which will record the results of the computer's output.

The read out equipment will be built around the Charactron tube built by Stromberg-Carlson. It will permit the display and photographing of about 15,000 characters per second. That's about 10 million words per hour.

•

TETRACHLORIDE

DO YOU still use carbon tetrachloride to clean things around the office? If so, you should know how much of the stuff you can take. The American Standards Association, 70 East 45th St., New York 17, N. Y. has just issued a standard on the subject. It warns that severe liver and kidney damage may be caused by exposures to "tet," and that high concentrations in the air has a narcotic effect similar to chloroform.

You can get the new standard from ASA for 50 cents in cash. Write to the above address and ask for Z37.17-1957. Standards on other toxic dusts and gases including trichloroethylene are also available.

•

"EARLY Electrical Machines" is the title of a book by Bern Dibner and published by the Burndy Library, Norwalk, Conn. It gives a brief history of electricity as it was known to the ancients—the experiments with rubbed amber and the magnetic properties of lodestone—then explores the period from 1600 to 1800. The latter are presented as "two enquiring centuries that led to the triumphs of the electrical age."

Copies of original engravings in old texts are reprinted, including an amusing drawing of an experiment in which a small boy, suspended from the ceiling by silken ropes, was part of an electrical circuit. The experiments which led to the first condenser—the Leyden Jar—are described and considerable space is given to the contributions of Benjamin Franklin.

The book, which has 57 pages, can be purchased for $2.50 from the Burndy Library.

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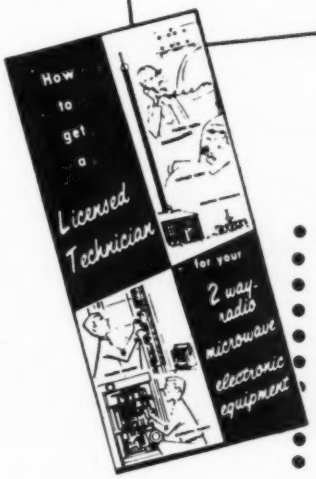

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Independent Pioneers Hold Meeting

THE INDEPENDENT Telephone Pioneer Association had a net gain of 245 members during the last year, and, at Sept. 30, it reached an all-time high membership of 4,476, Executive Secretary Mayme Workman told the Pioneers at their annual meeting, held during the recent convention of the United States Independent Telephone Association.

Following a business meeting, the Pioneers were entertained by two nationally-known barber shop quartettes. Berney Simner, representative of Acme Visible Records, Inc., and a past president of the Society for the Preservation and Encouragement of Barber Shop Quartette Singing in America, was master of ceremonies.

The business meeting was presided over by President Ralph F. Lucier of Warsaw, Ind. He urged that Independent telephone operating and manufacturing companies become associate members of the association and that all members work toward increasing the individual membership.

Mrs. Workman reported that she has attended four state conventions during the last year—Indiana, Illinois, Missouri and Nebraska, as well as annual meetings of the following Pioneer chapters: J. K. Johnston Chapter (Indiana), Theodore Gary Chapter (Missouri), Frank H. Woods Chapter (Nebraska).

She also reported the formation of two new chapters—the Last Frontier Chapter in Alaska, and the Buckeye State Chapter in Ohio.

The Pioneers voted a change in the association's by-laws providing for an auxiliary membership for wives and husbands of active members, who are not engaged in the telephone industry or its associated interests, or who have not yet completed the 15 years required to become an active member. Auxiliary members will not have the right to vote and cannot qualify for life membership.

The Pioneer Resolutions Committee submitted a resolution commemorating the deaths of 63 Independent Pioneers. Those whose deaths were reported during the past year were:

Laverta F. Andrews of Avoca, Neb.; E. G. Benoist of Chicago; E. D. Brink Jr. of Springfield, Ill.; Frances Burmeister of Des Plaines, Ill.; L. W. Carmichael of Chicago; C. E. Chowning of Lincoln, Ill.; V. B. Clark of Fort Dodge, Ia.; J. O. Conway of Mission, Kan.; H. G. Culver of Oakfield, Wis.; F. L. Dowling of Meadville, Pa.

R. C. Duckworth of Macon, Mo.; Manta J. Elder of Ottawa, Kan.; R. B. Etzkorn of Jacksonville, Ill.; C. F. Fairly of Los Angeles, Cal.; H. D. Fargo Sr. of Chicago; A. R. Fritz of Lincoln, Neb.; W. A. Gibson of Sheboygan Falls, Wis.; Philip Grossman of Milwaukee, Wis.; M. A. Higgins of Evanston, Ill.; G. R. Hughes of Shell Rock, Ia.

Don Hunsaker of San Angelo, Tex.; J. F. Jaap of Chicago; L. H. Jenks of Carthage, N. Y.; A. B. Jordan of Tampa, Fla.; C. W. R. Keck of Emmaus, Pa.; R. S. Knutsen of Greenwood, Wis.; J. L. Lantz of Ada, O.; Lillian M. Lawson of Jamestown, N. Y.; J. R. Louderback of Vienna, Mo.; E. F. Ludlow of Safety Harbor, Fla.

D. W. Mason of Brunswick, Mo.; H. T. McCaig of Berwyn, Ill.; R. F. McKelvy of Gibsonia, Pa.; W. O. McOmber of Crete, Neb.; W. C. Meredith of Atlanta, Ga.; Mary D. Miller of Jamestown, N. Y.; G. C. Mitenbuler of Lorain, O.; Elizabeth A. Morrison of Brownville, Neb.; C. A. Nelson of Lincoln, Neb.; Ebba Nannie Newburg of Ridgway, Pa.

W. E. A. Nottorf of Topeka, Kan.; B. R. Overcash of Lincoln, Neb.; George Painter of Columbus, O.; W. T. Patton of Cornelia, Ga.; George Pratt of Ridgefield Park, N. J.; Ida B. Ronne of York, Neb.; N. F. Salisbury of Pulaski, N. Y.; August Seager of Rochester, N. Y.; G. O. Seaton of Lincoln, Neb.; O. D. Shaffer of Memphis, Mo.

F. L. Shelton of Columbia City, Ind.; C. Myrtle Singmaster of Macungie, Pa.; W. J. Sowers of Monrovia, Cal.; W. H. Spurlock of Lincoln, Neb.; R. L. Stevens of Lincoln, Neb.; H. J. Thurn of Fredonia, N. Y.; H. R. Van Deventer of New York; F. B. Wersing of Hilo, Hawaii.

Allen Willits of Maiden Creek, Pa.; E. W. Wood of Kingsville, O.; G. J. Woods of Lincoln, Neb.; A. B. Wright of Warren, O. and F. H. Wright of San Bernardino, Cal.

The following directors were elected by the Pioneers: Ray J. Alter of Galesburg, Ill., George A. Hearne of Kansas City, Mo., and K. L. Lawson of Lincoln, Neb.

Other directors are: R. N. Cole of Marion, O., D. B. Corman of Glasgow, Ky., George Hamburger of Washington, D. C., E. M. Hiestand of Madison, Wis., W. F. Miller of Des Moines, Ia., and W. P. Strickenburg of Meadville, Pa.

The directors elected the following officers: President, Mr. Cole; vice presidents, Mr. Strickenburg and Mr. Corman, and executive secretary and treasurer, Mrs. Workman.

The following were elected members of the Pioneer association Advisory Committee: H. B. Fine of Rison, Ark.; S. R. H. Pipe of Prince Albert, Sask., Canada; H. W. Vaughan of Chickamauga, Ga.; Alice K. Kea of Honolulu, T. H.; Otto Schupfer of Kendrick, Ida.;

(Please turn to page 47)

Officers and directors of the Independent Telephone Pioneers Association. Left to right: W. F. Miller of Des Moines, Ia.; Mayme Workman of Springfield, Ill.; E. M. Hiestand of Madison, Wis.; R. F. Lucier of Warsaw, Ind.; D. B. Corman of Glasgow, Ky.; R. N. Cole of Marion, O.; George Hamburger of Washington, D. C., and W. P. Strickenburg of Meadville, Pa.

TELEPHONY'S Traffic Engineering Handbook

By Gilbert R. Brackett

Nov. 2, 1957

Section 4 (Continued)
Step-By-Step System

The maximum number of simultaneous calls a trunk group will receive is dependent upon the customers having access to the group and so it is subject to much fluctuation. In large groups of customers' lines such fluctuations are less abrupt and not so pronounced as in small groups and so, the larger the group the more accurately the traffic engineer can predict the maximum number of simultaneous calls that will be originated and, therefore, be able to engineer with more precision the number of trunks that will be required.

Part 5
Traffic Engineering Assumptions

The time of day and generally the week, month or year have an influencing affect on traffic loads. Usually, more traffic will flow during the late morning and early afternoon than at any other time during normal days. Holidays and special events cause surges of traffic as do random incidents such as bad weather, emergencies or local calamities.

The mutual interest between two persons, departments or businesses, influences the number of calls that will be placed during a period of time and also the duration of the call.

Out of these and other considerations must emerge the provision of necessary facilities in so far as traffic requirements are concerned. Practical situations and experience have worked toward reducing the number of variables that enter into traffic calculations.

Really, there are only two factors which must be dealt with in deciding what average percentage of attempted calls will not be completed on a given facility—economy and user satisfaction. Methods are in use by which the number of switching paths and trunks can be determined from the estimated traffic to meet these two factors for most situations. The busy hour must be found. Peg count register readings made half-hourly over a minimum period of three days, selecting a busy period each day and arriving at an average, should assure establishing a busy hour. It is usually the case that the busy hour for one facility in an office varies in time of day with that of another facility.

The term "office busy hour" is sometimes used and applies to that time of day when the over-all traffic in an office is at a maximum. On new installations, such an assumption should be followed. On additions, actual individual trunk or switch group facts should be used.

Mutual interest and the cost of holding a connection determine the time that the conversation will last, once a connection is made. The holding time, in seconds, is the sum of the time taken to complete a connection, the time to maintain a conversation and the time to break the connection.

The grade of service can be defined as the percentage of attempted calls during the busy hour which meet up with an all-trunk busy condition. Normally, traffic tables are used to arrive at the number of trunks or switches required for a given volume of traffic, a certain percentage of calls (1, 10, 20, 30, etc.) will encounter an all trunk busy condition. The choice of table to be used depends on the grade of service desired at the particular exchange under consideration.

Part 6
Line Finders

Line finders are used in step-by-step dial systems to connect a larger number of lines to a lesser number of selectors or trunks. Each 200-point line finder group consists basically of two shelves of 10 line finders each and associated line and cut-off relays. Their primary function is to make connection between a calling line and a first selector when the calling party at a dial station removes the receiver from the switchhook. In a manner of speaking, the line finder performs the duties of the operator in a manual office who plugs into a lighted answering jack and says, "Number please," the dial tone telling the calling party the apparatus is awaiting his order.

The engineering of any telephone office should be on the basis of expected growth or loss as dictated by the development estimate covering the particular exchange under consideration. In dial offices, a cushion should be provided in the line finder groups to care for load balancing, testing, changes and growth; that is, each group should be assigned stations short of its capacity in order to care for these conditions when they arise.

Line finders for both the original and ultimate periods should be determined in order that the proper type of line finder frame may be installed and space reserved for the ultimate office arrangements.

To Determine Line Finder Requirements

To determine the number of line finder groups needed to handle the working lines of an office, divide the total number of working lines in the office by the number of working lines which will be assigned to each group. To determine the number of line finders needed per group, multiply the 100 call seconds (CCS), also referred to as Unit Calls (UC), which will be developed by each line by the total number of lines that will be assigned to the group. This product is the total CCS load per group and can be read directly into the accompanying Line Finder Capacity Table.

Example

We shall assume there are 1,400 working lines in this

(Please turn to page 32)

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at Parsons College

(Right) The Parsons College switchboard is equipped with 40 lines, 4 local links, 4 city trunks, and conference service. The capacity of the 40A is 40 lines, 6 local links, and 10 city trunks. Conference service is an optional feature.

Parsons College at Fairfield, Iowa, is a liberal arts school with 26 buildings scattered over its 55 acre campus. Telephone service between many of the buildings and to the main exchange is provided by a Leich 40A PABX switchboard. Here's how this Leich PABX keeps telephone traffic moving without a hitch.

Leich's exclusive keyset turret extends incoming city trunk calls quickly. When the attendant at Parsons receives such a call, she reaches the inside telephone by merely pressing two keyset buttons in sequence.

This simple operation connects the incoming call to a party in any of the school's several buildings which have PABX extensions. Callers are seldom, if ever, kept waiting by a busy attendant.

The folks at Parsons make their inside calls, consultation calls, and outgoing city trunk calls easily, too. They make these calls themselves—without assistance from the turret attendant.

The backbone of the 40A PABX is our Leich all-relay dial switchboard. It's modeled after the famous Leich Dial System. It offers dependable switching in a compact cabinet which will fit in any modern office or plant.

Pictured above, extreme right, is the Parsons College switchboard. Mr. Art Baker (right), District Manager in Fairfield of the United Telephone Co. of Iowa, recommended the Leich 40A PABX to the school. With him is Mr. Gene Savage, Equipment Superintendent of the United Telephone Co. of Iowa. He is shown examining the Leich equipment.

Features Your Customers Will Like

1. Uses Standard Leich telephones.
2. Any non-restricted inside station may call outside without waiting for the attendant.
3. Local links are not tied up on extension dialed calls to city trunks.
4. All the power equipment is contained in the switchboard cabinet.
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6. Restriction of outside calls if desired.
7. Night answering by any telephone.
8. Inside telephones have two digit numbers.

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hypothetical office and that these 1,400 lines have a busy hour usage of 3,376 CCS. The office has 200-point line finders so, should we assume a 10 per cent reserve (cushion) for load balancing, etc., we will have 180 working lines per group.

3,376 CCS ÷ 1,400 Working Lines = 2.41 CCS per line

1,400 working lines ÷ 180 working lines per group calls for seven full groups leaving 140 lines not provided for. These extra 140 lines will be assigned to group 8.

And so:

180 lines per group × 2.41 CCS per line = 434 CCS per group

140 lines per group × 2.41 CCS per line = 337 CCS per group.

NO. OF LINE FINDERS	PER CENT DIAL TONE IN EXCESS OF THREE SECONDS						NO. OF LINE FINDERS
	0.5%		1.5%		5.0%		
	CCS PER		CCS PER		CCS PER		
	LINE*	GROUP	LINE*	GROUP	LINE*	GROUP	
5	.21	40	.28	55	.37	72	5
6	.30	58	.40	77	.49	96	6
7	.40	77	.51	98	.63	122	7
8	.50	97	.63	122	.77	150	8
9	.61	118	.74	144	.92	178	9
10	.72	140	.87	168	1.07	208	10
11	.85	164	.99	192	1.20	232	11
12	.96	186	1.12	218	1.36	264	12
13	1.08	210	1.25	242	1.51	292	13
14	1.21	234	1.39	270	1.66	322	14
15	1.34	260	1.53	296	1.80	350	15
16	1.46	284	1.67	324	1.96	380	16
17	1.60	310	1.81	352	2.11	410	17
18	1.73	336	1.96	380	2.27	440	18
19	1.87	362	2.10	408	2.42	470	19
20	1.99	388	2.25	436	2.58	500	20
21	2.13	414	2.38	462	2.73	530	21
22	2.28	442	2.55	494	2.89	560	22
23	2.41	468	2.68	520	3.07	595	23
24	2.56	496	2.84	550	3.22	625	24
25	2.71	525	2.99	580	3.38	655	25
26	2.83	550	3.14	610	3.53	685	26
27	2.99	580	3.30	640	3.71	720	27
28	3.14	610	3.45	670	3.87	750	28
29	3.30	640	3.61	700	4.05	785	29
30	3.43	665	3.76	730	4.20	815	30

*Assumes 194 working lines per group

Step-by-step Line Finder Capacity Table

Then, by referring to a Column 1.5% in the Line Finder Capacity Table (showing the grade of service these groups will give) we find that 434 CCS per group calls for 20 line finders for each of the seven full groups, and that 17 line finders will suffice for the 337 CCS offered to the partial group.

Therefore, the total line finder requirements for the office would be seven groups fully wired and fully equipped with 20 line finders and one group fully wired but equipped with only 17 line finders. And, so, this particular office line finder requirements would read:

7 groups of 20 line finders (7 × 20) = 140

1 group of 17 line finders (1 × 17) = 17

8 groups Total required line finders 157

Where a small number of lines remain beyond the last full group of line finders, two alternatives should be considered. If the number of lines left over is but a few and would call for providing a partial group equipped with one or two line finders, it might be practical to scatter those lines over the full groups rather than engineer an additional partial group, especially should they require additional frames. This method, however, would reduce the spare line terminals for load balancing, etc. The other alternative would be to provide a fully equipped line finder group. This latter plan has a number of advantages, especially in the larger central offices where growth is expected.

Connectors

Connectors are the last in the train of switches in a step-by-step office and respond to the "tens" and "units" digits dialed by the calling party. Their function is to connect the calling party to the called line, give the proper ring and return an audible ringing signal to the calling party or return a busy signal should the called line be busy.

In estimating the traffic per connector group, it is assumed that terminals will be assigned to the various

NUMBER OF CONNECTORS	CCS CAPACITY	
	TABLE 10	TABLE 20
5	46	56
6	64	76
7	84	97
8	105	119
9	126	142
10	149	166
11	168	186
12	187	206
13	205	228
14	223	248
15	241	268
16	259	288
17	276	308
18	294	326
19	312	346
20	329	366
21	347	386
23	382	424
25	417	462
27	451	500
29	485	540
31	519	575

Connector Capacity Table

grades of service uniformly so that the load submitted to each group will be approximately equal. In general each connector group of the same class (regular, rotary, combination, etc.) will be equipped with the same number of connectors. The sum of the CCS load of all groups in the office should approximate the total CCS from all classes of service, taking into account the office busy hour, nature of the local, toll and incoming traffic and the group busy hour characteristics of the traffic flowing into the connector groups.

Each connector group must be provided with a test connector which is mounted on the connector shelf and has access to the 100 terminals in the group. These connectors are used by operators to verify busy lines and certain tests are made through them from the test desk.

There are three general categories of connectors—non-hunting, rotary hunting and level hunting. The different types within these categories and their normal use is:

(Please turn to page 48)

today's

Highlights

of finance-taxes-business trends

by Willard F. Stanley

"LOOKOUT BELOW"—IS LATEST STOCK MARKET SLOGAN: Sooner than expected the stock market broke sharply downward from its September levels (Sept. 24 as reported in our last column) to reach a figure, at Oct. 25, 17 per cent under the 1956 year end, according to the New York Times 50 combined stock average. This compares with 11 per cent below Dec. 31, 1956 at Sept. 24.

During October, the market had to contend with important adverse factors, notably the "Sputnik" development and the Middle East Syrian crisis. Both items were given more importance than they deserved in terms of stock values. Either Russia's stealing a march with "Sputnik" has no practical effect, or it indicates Russian modern arms supremacy which, in case of all out atomic war, would probably eliminate the stock exchange and most values thereon in toto. So, in either case it seems foolish to permit such a development to influence stock prices. But the investing public, when alarmed, is not notable for calm and reasoned logic.

The break through from the "10 per cent swing level," adhered to so religiously in the market for two and a half years, has created considerable psychological disturbance among investors. There has been a tendency to take profits, to sell out new margin accounts where losses are involved and refrain from new purchases until the atmosphere clarifies. Technical rebounds from drastic lows will be in the cards, as always, but with business poised unsteadily at or near its high activity level (on average), and with somewhat greater chance for decline than improvement in sales and profits in many lines from this time forth, it seems unlikely the market will quickly recover all or most of its losses of the last three months.

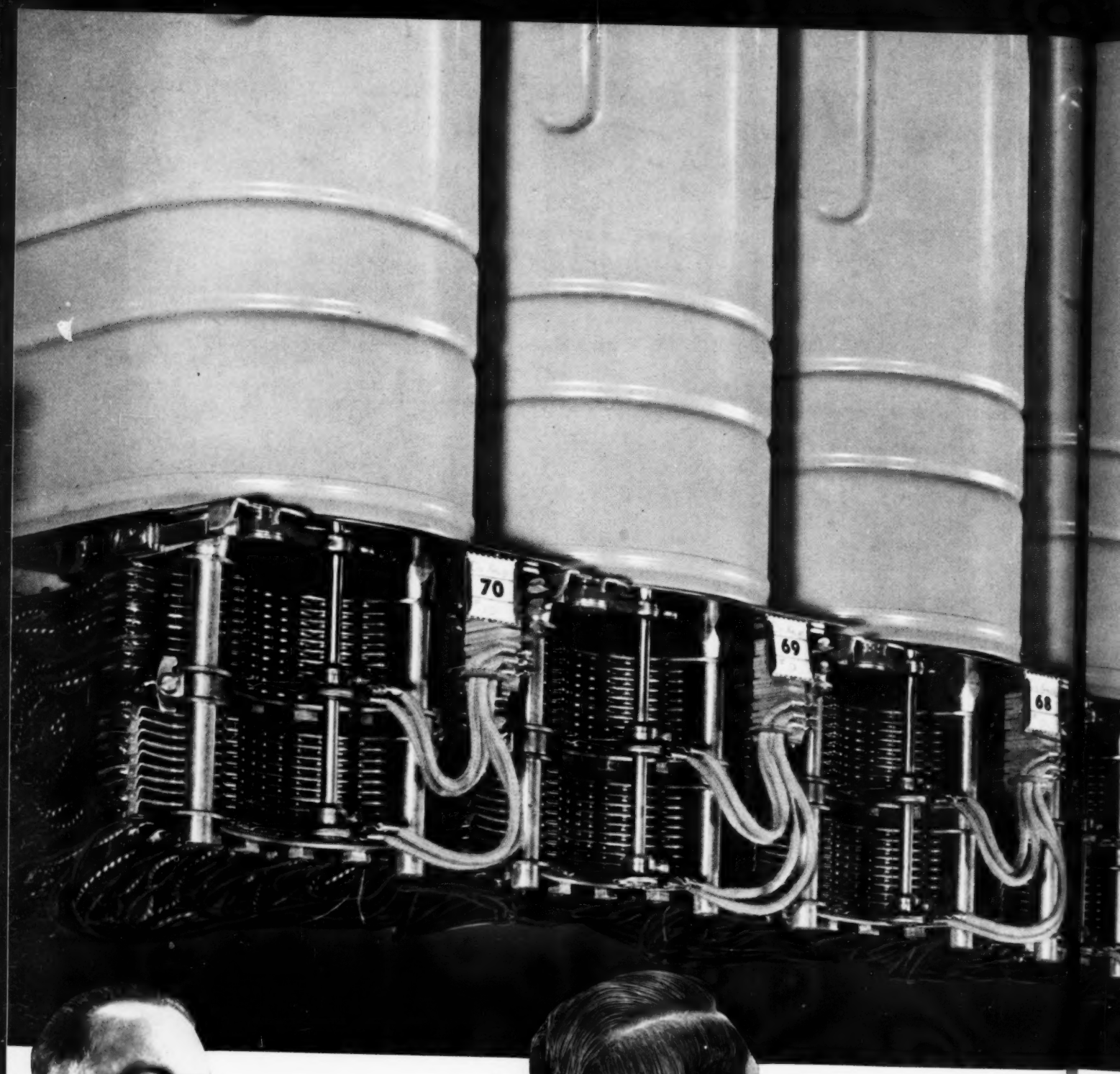
Obviously, new commitments by investors should be highly selective—featuring, where possible, items of equal merit which are near their lows for the year. Missile manufacturing companies may extend their stock rise but there is danger that this enthusiasm may be overdone. Selected electric and telephone utility equities, particularly those with properties located in the interior and preferably in smaller communities, and, therefore, least apt to be affected by alarms of forthcoming all-out atomic warfare, seem most likely candidates for shifts from undesirable industrial situations. Such switches should produce equal or greater income while providing a defense against further adverse market conditions.

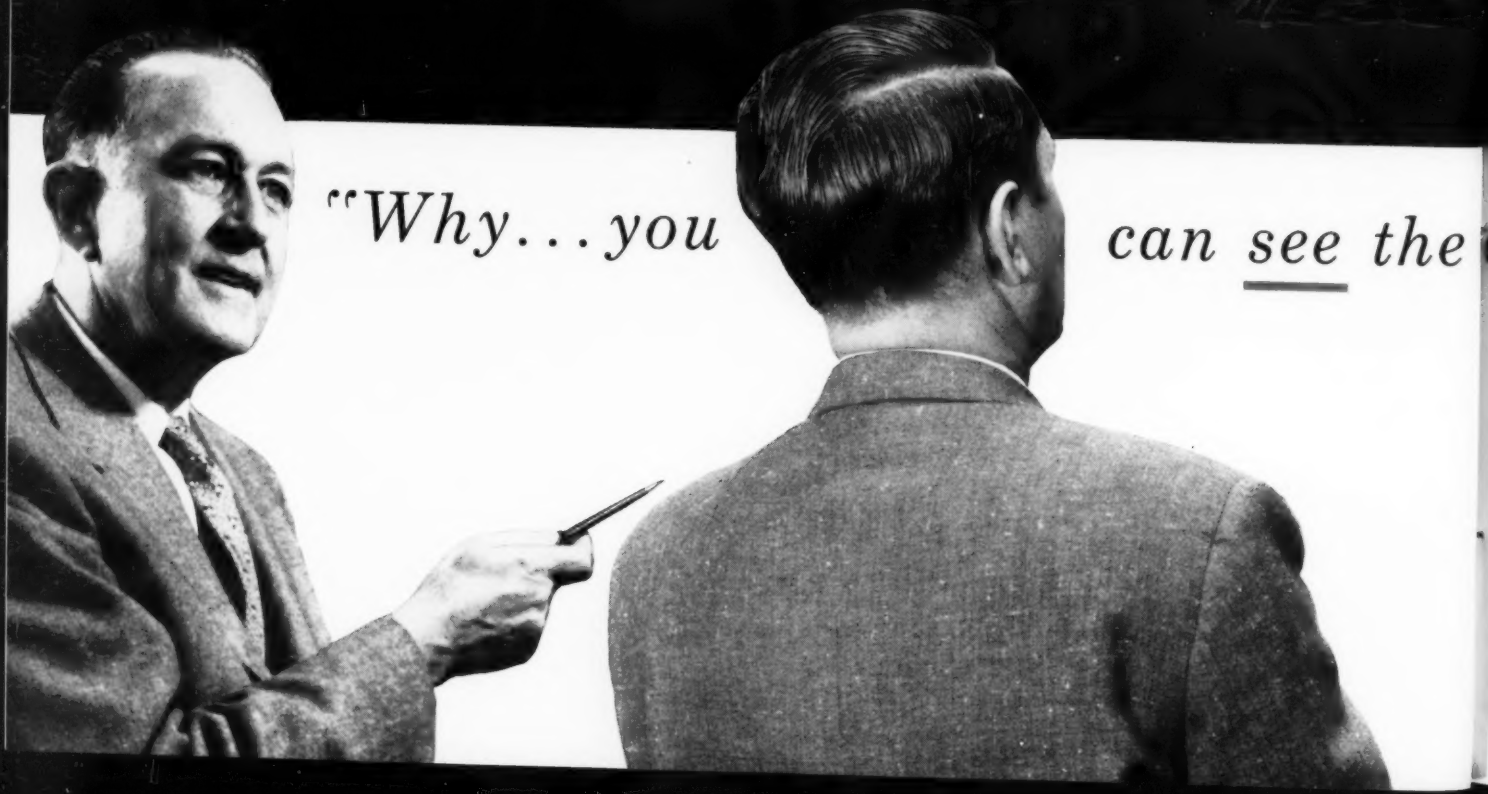
* * * *

COROLLARY TO HIGH INTEREST: Utilities which have been following the policy of capitalizing "interest during construction" should consider whether the rate they

(Please turn to page 36)

Mr. Stanley, formerly financial vice president of Southwestern Public Service Co., an electric utility with over 160 million dollars in assets, is president of Corporate Services, Inc. of New York City. He is a member of Controllers Institute of America and New York Society of Security Analysts. He serves on three committees of the Controllers Institute having to do with federal taxation, social security and finance management. His articles are appearing once a month in TELEPHONY.





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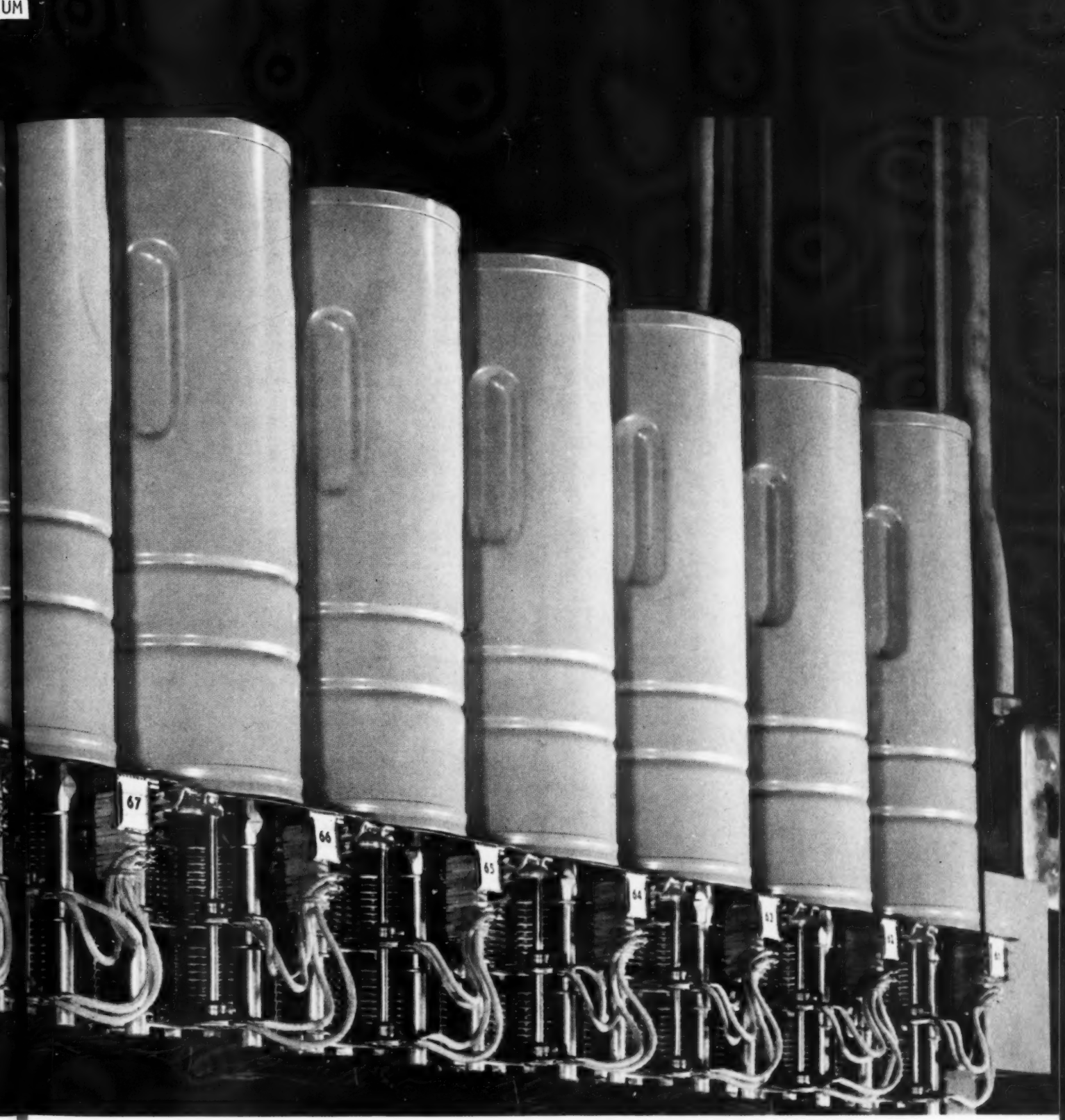

e aftsmanship they put into Strowger!"

Friend tells friend — and it's no wonder they're so enthusiastic.

You'll see why, when *you* inspect a Strowger Automatic exchange. You're sure to admire the craftsmanship we put into this splendid equipment.

And when you scan the maintenance figures—when you check the records and see the fine, dependable service Strowger provides—you'll find that its quality "pays off" for the telephone company.

Why not do that bit of checking—soon? Then get in touch with us. Our experienced engineers will be glad to help you in any way they can. Address: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call FIllmore 5-7111.*

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have been using for this purpose is in line with high money costs presently prevailing. Those utilities which have not previously been capitalizing this item, may wish to now consider whether it isn't wise to initiate this practice in view of the substantial amounts which may be involved at current money rates.

This applies particularly to those utilities expanding rapidly and especially where the property additions are such as to be readily identifiable without much trouble or expense. As telephone company managements are generally aware, capitalization of "interest during construction" at a reasonable rate is permitted by the systems of accounts of the FCC and of the association of state utility commissioners. The advantages of capitalizing the present high rate applicable to interest during construction (which involves the cost of equity money as well as interest on funded debt) are, first, the company's rate base is increased to the extent of the amount so capitalized, which is added to the cost of the project; second, while taken as income on the books, the interest item need not be treated as income for federal income tax purposes, thereby causing a considerable saving by deferring taxes on an amount equal to the portion of the cost of new facilities so capitalized for a period equal to half the life of the facilities.

* * * *

MORE ABOUT TAXES: In last month's column it was pointed out that continued aggressive effort was needed to prevent further increases in state taxes. A more recent Wall Street Journal comment on the subject shows per capita state tax collections of all kinds increased about 6 per cent in the 12 months ended June 30, 1957, over the same period a year previous. The latest June 30 12-month period was nearly 20 per cent above two years earlier. This furnishes striking confirmation of the rapid state tax increase. While the per capita figure applies primarily to taxes paid by individuals, it is logical to assume that collections from corporations (including utilities) increased at an equal or greater rate.

* * * *

INTEREST RATES ON LONG TERM DEBT STILL HOLDING: Late September and the first three weeks of October found the interest rate picture for new funded debt offerings relatively unchanged. While offerings continued to be substantial, they have been absorbed without material disturbance in the market.

Wall Street Journal tabulation at Oct. 18, showed that the average bids for 16 new utility funded debt issues were at a yield one decimal (0.01 per cent per annum) below the yield based on the offering prices of these issues. This differential was below that indicated a month previous, but this is probably due to lower yields at which the relatively newer issues were offered.

An astute representative of a leading investment service (one of those which rates utility bonds) told us recently that they feel the top in interest rates may have already been reached and that a movement from the present high rate plateau is more likely to be on the downside, although nothing sensational is looked for in this direction for the next six months at least. We are inclined to concur in this appraisal.

But, these mildly optimistic views are still far enough off and sufficiently questionable to indicate the desirability of prospective utility long-term borrowers proceeding to raise their near-term requirements on schedule, without either acceleration or deferral from normal procedure.

Prices of utility common stocks, although hit fairly hard in spots in recent declines, remain, for most companies, at satisfactory levels for financing, so no deferral seems wise as to raising that type of funds.

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

THE PRESSURIZING of telephone cables—both aerial and underground—is not a new idea. Telephone companies have realized the advantages of this type of maintenance for several years, and at the present time many miles of toll and exchange cable are maintained under constant pressure.

Oil-pumped nitrogen furnished in cylinders equipped with pressure and volume gauges was first used to pressurize cables. While this method proved satisfactory, the gas volume required for a large cable system also proved to be extremely expensive in most cases.

This objection has now been overcome by the use of a compressor-dehydrator which pressurizes the cable by using moisture-free air. A motor-driven compressor provides the air pressure and a desiccant tower equipped with necessary controls, extracts all harmful moisture. The latest model dehydrator is equipped with a humidistat which operates a by-pass valve and expels all air containing over 4 per cent relative humidity.

Other safety features of the system are the "Hi-Lo" pressure-operated micro-switches, power failure alarm relay, humidity alarm relay, and a shuttle valve that insures uninterrupted pressure on the cables should the compressor-dehydrator fail to operate as in the event of a power failure. In such a case, a cylinder of oil-pumped nitrogen, that is on standby, will provide the required pressure.

In order to determine whether a cable is leak-proof or not, the volume and consumption of air must be recorded. The system has a flowmeter installed on each cable leaving the exchange to indicate the pressure and air used. With this system, trouble can be detected by reading the flowmeters at fixed intervals. A higher than normal air flow indicates a leak in that particular cable.

When a pressurized cable does develop a leak, caused by a normal sheath opening, trouble does not ordinarily result if the air flow and adequate pressure are maintained. The escaping air will, in the great majority of cases, prevent the entrance of trouble-causing moisture. If a leak develops during a storm, the service is not interrupted and by maintaining proper air pressure, lines can be kept working until repairs can be made in fair weather.

Another feature that can be used on a pressurized cable system is a contact alarm. These contactors can be placed at fixed intervals along a cable or at the extreme end. The contactor closes through a high resistance when the pressure drops on a cable.

This closed contactor can be detected by the line insulation test although it will not ordinarily affect the operation of a subscriber's line.

The automatic dehydrator method of pressurizing cable has been installed in many telephone systems and in each case is doing an excellent job. These systems are scattered from the Atlantic to the Pacific and from Cuba to British Columbia.

It must be remembered, however, that the average old cable system cannot be pressurized until it has been properly conditioned. Some telephone companies start preparing their cable plant six months to a year prior to the time their compressor-dehydrator equipment is to be installed. Small leaks in the sheath must be repaired and pressure-type terminals provided.

When pressure-tight terminals are not available, the pressure may be held by installing wax dams in the can tails.

The importance of telephone service and other types of communication is increasing in importance each year. We are rapidly approaching the time when service interruptions of even short duration will not be tolerated.

Even now in many cases service interruptions are proving extremely expensive and an all-out effort is being made to provide continuous service. It has been estimated that service failures due to moisture in underground cables will be reduced at least 90 per cent when the pressurized system is used.

There is no doubt that pressurized exchange cable systems and the use of the compressor-dehydrator method will do much to insure uninterrupted service.

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We note, with considerable interest, that the Lincoln (Neb.)' Telephone & Telegraph Co. has recently acquired two new, three-wheel motor scooters for the use of its plant personnel.

These machines are of the same type as the U. S. Postal Service "Mailmaster" now being rather extensively used in many cities.

For some time past, there has been an indicated need for a certain kind of motor vehicle that could carry repairmen's equipment and yet be small enough to be parked in downtown areas without creating a traffic hazard.

The main advantages claimed for this type vehicle are its low cost of investment and maintenance, its maneuverability, and its ease of parking in limited spaces. The experience of the Lincoln company will be watched with great interest. It appears highly probable that this type vehicle may be rather extensively used in the telephone industry in the future.

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We have a report of a 73-year-old telephone pole that is still in service out in California. This pole, a 25-foot, square, untreated, tapered redwood, was installed in 1884 and is still standing and in excellent condition. Neither has this pole ever been stubbed nor reset. Experts are of the opinion that this pole must be from the heart of the redwood and that it must have been cut near the base of the tree.

XUM

West Virginia Association Holds Sixth Annual Meeting

THE WEST VIRGINIA Independent Telephone Association has changed its name to the "West Virginia Telephone Association," due to the addition to active membership of the Chesapeake & Potomac Telephone Co. of West Virginia, said President Edward S. Filler of Davis at the sixth annual convention at Blackwater Lodge, Davis, on Sept. 30-Oct. 1.

There are 27 Independent telephone companies, in addition to the C&P company which are now members of the association. There are 34 associate members.

Independent members of the group represent 70 exchanges, 46,068 stations, or 93.8 per cent of all Independently owned stations in the state, while the Cheapeake & Potomac Co. of West Virginia operates 134 exchanges, with 406,488 stations, reported Secretary-Treasurer Gerald H. Parks of Davis.

The Hon. T. D. Kauffelt, member of the West Virginia Public Service Commission, at the opening session discussed the duties of the commission and the services which it renders. W. Murray Smith of Clay introduced Hugh A. Barnhart of Rochester, Ind., vice president of the USITA, who talked on the activities of the national association and its "60 Years of Independent Telephony." West Virginia, by action of its Governor Underwood, was one of the states proclaiming Sept. 8-14 Independent Telephone Week.

A feature of the Oct. 1 general session was a microwave demonstration by William E. Coffman of Chesapeake & Potomac Telephone Co. of West Virginia. Group discussions were addressed by two representatives of Shumway J. Bird & Co.: James B. Lyford, public utility accountant, of Washington, D. C.; and Robert Finch, public utility accounts, of Springfield, Ill., who spoke on, respectively, public utility accounting, and financing for small telephone companies.

Carl Ballentine of Pine Grove was chairman of the committee arranging the departmental conferences and W. Murray Smith of Clay was toastmaster at the banquet session.

New directors of the association, to serve for three-year terms, are: Frank G. Hoffman of Bluefield, Giles C. Downing of Charles Town and John Fordyce.

The directors elected the following officers: President, Donald Roush of New Haven; first vice president, Robert Ingle of St. Mary's; second vice president, Mr. Downing and secretary-treasurer, G. Robert Gish of Bluefield.

1958 directors and officers of the West Virginia Telephone Association, left to right: President Donald Roush of New Haven; John Fordyce; Carl Ballentine of Pine Grove; Frank Hoffman of Bluefield; Second Vice President Giles C. Downing of Charles Town; J. M. Bear of Marlinton; First Vice President R. W. Ingle of St. Marys and Edward S. Filler of Davis, the outgoing president.

Mealtime scene at the West Virginia Telephone Association convention.

Alabama Independent Completes 50th Year

The People's Telephone Co., Inc., Collinsville, Ala., is celebrating its 50th anniversary. When Walter T. Weaver purchased the company on Nov. 3, 1907, it was known as the Collinsville Telephone Co. and it served 40 telephones.

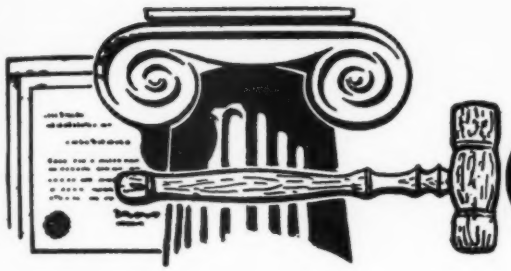
Today the company operates over 600 miles of rural line, has a toll center at Leesburg, and serves 2,201 telephones. The company reports its telephones are ready for Direct Distance Dialing (DDD). Walter T. Weaver's son, M. G. Weaver, is president and his grandson, Jackie G., is vice president and assistant manager.

Obituary

EDWARD J. BYRNES JR., assistant general manager of sales, eastern division of The Colorado Fuel & Iron Corp., died Oct. 8, at the Palmer Spring plant of CF&I in Palmer, Mass.

Mr. Byrnes started his career in 1925 as an administrative assistant in the springs and formed wire department of the Wickwire Spencer Steel Co., which later merged with CF&I. He later became assistant product manager and then product sales manager of the springs and formed wire department.

Surviving are Mr. Byrnes' wife, Marie, his mother, a son, a daughter, two brothers, a sister and six grandchildren.



Courts and Commissions

C&P Gets OK to Pass Along Local Taxes in W. Va.

The West Virginia Public Service Commission has given the Chesapeake & Potomac Telephone Co. of West Virginia permission to add to customers' bills the cost of taxes or fees collected from the company by the municipality or county in which the customers receive service.

The commission, in an order made public Oct. 11, approved the proposal, as contained in a tariff revision filed by the company last April 25.

Hearing was held in the case on June 27, and on July 19 the commission issued an order suspending the effective date of the proposal. The new order lifted the suspension, effective Oct. 17.

The order also overruled a motion by the city of Morgantown to dismiss the proceeding.

Commissioners T. D. Kauffelt and Hillis Townsend concurred in the order. Commission Chairman Myron R. Renick filed a "partial dissent."

The commission order noted that Huntington and Martinsburg are the only localities at present collecting taxes from the C&P company which are within the scope of the regulation.

However, there is pending in Monongalia County Circuit Court litigation between C&P and the city of Morgantown to determine the validity of a tax which the city seeks to impose against C&P.

Under the commission order, C&P will be able to pass along to Huntington and Martinsburg customers—and to those in Morgantown if the court upholds the tax there—the cost of the taxes imposed by their respective cities.

The regulation authorizes C&P, which serves most of West Virginia's main population centers, to bill customers on a pro rata basis for the cost of any of the local charges levied against the company by the city or county within which the customers receive telephone service.

Authorize Kansas Merger

The Kansas Corporation Commission on Oct. 16 authorized the merger of the Osage Telephone Co., Osage City, and the Miller Mutual Telephone Co. with W.E.G. Dial Telephone Co., Inc., Gardner. The W.E.G. company bought the Osage company on Feb. 13 (TELEPHONY, Feb. 23, p. 59).

Minnesota Commission OKs Sales of Three Companies

The Minnesota Railroad & Warehouse Commission on Oct. 21 authorized the following purchases:

Sale of the entire Minnesota property, 16 stations, of the Springwater Telephone Co., Garretson, S. D., to the Garretson (S. D.) Cooperative Telephone Association.

Sale of the entire properties of the Hokah Cooperative Telephone Co., serving approximately 315 stations, to the Ace Telephone Association, Houston.

Sale of the entire property of the Waukenabo Township Telephone Co., Palisade, to O. L. Johnson of McGregor, Minn.

Missouri Independent Asks To Sell Exchanges

The Inter-County Telephone Co., Gallatin, asked the Missouri Public Service Commission on Oct. 21 to sell part of its exchanges to the Mid-West Telephone Co., Inc., Springfield.

Inter-County operates a dozen exchanges in Northwestern Missouri. By selling those at Maysville, Stewartsville, Osborn, Amity, Clarksdale, Fairport and Weatherby, plus a toll line from St. Joseph to Clarksdale and Maysville, Inter-County plans to finance improvements for its remaining system.

Mid-West is a new company, authorized by the commission in August to enter the telephone business.

OKs Sale of Mo. Company

The Missouri Public Service Commission on Oct. 17 approved sale of the Marion Rural Telephone Co., Bethel, to Mark Twain Rural Telephone Co., Bethel (TELEPHONY, Oct. 5, p. 38).

Wisconsin Bell Petitions For Increase in Rates

A rate increase was requested on Oct. 21 by the Wisconsin Telephone Co. in a petition to the Wisconsin Public Service Commission because, the company claims, its present rates are "insufficient, unreasonable and unlawful."

No specific rate increase was requested by the company, but it asked the commission to hold hearings following the outcome of current wage negotiations.

The company was granted a rate increase on July 24 to raise annual net operating income by about one million dollars (TELEPHONY, Aug. 3, p. 35).

At that time the commission said the increase would enable the company to realize a return of about 6 per cent on its net investment.

In asking for new hearings, the company said the present rates will not permit it to reach "the level of earnings found to be reasonable."

Cal. Company Registers 150,000 Shares Common

California Interstate Telephone Co., Victorville, registered 150,000 shares of common stock with the Securities & Exchange Commission, it was reported on Oct. 16.

The company plans to offer the shares for public sale through an underwriting group headed by William R. Staats & Co. Proceeds will be used to repay short-term bank loans and to finance construction, the company said.

South Dakota Commission Refuses Bell Rate Plea

Northwestern Bell Telephone Co. was refused a general rate increase on Oct. 18 by the South Dakota Public Utilities Commission, the commission maintaining that the company's present rates were providing a "fair and reasonable" 5.90 per cent return on its $26,809,596 rate base (TELEPHONY, March 30, p. 46).

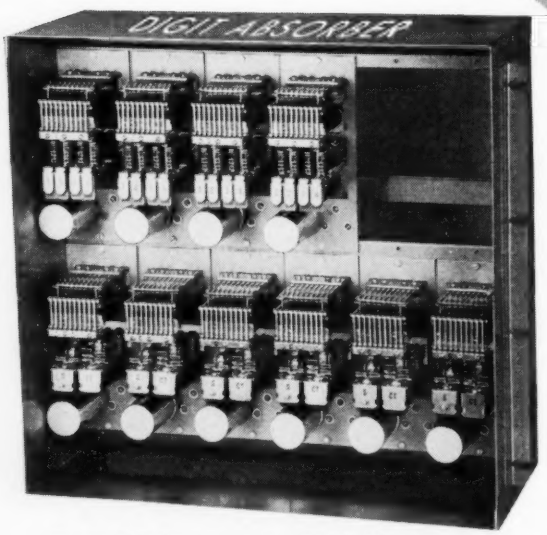
The commission also observed:

(1) That it is within the discretion of the company by its own management

(Please turn to page 42)

Can your Switchboard handle

2-5 DISTANT DIALING?



Typical Relay Case for Digit Absorber.

The Universal Digit Absorber employs simple circuity with a magnetic impulse counter, together with other standard relay apparatus of recognized manufacture.

Other UNIVERSAL Telephone Equipment:
Code-to-Selective RINGING CONVERTER
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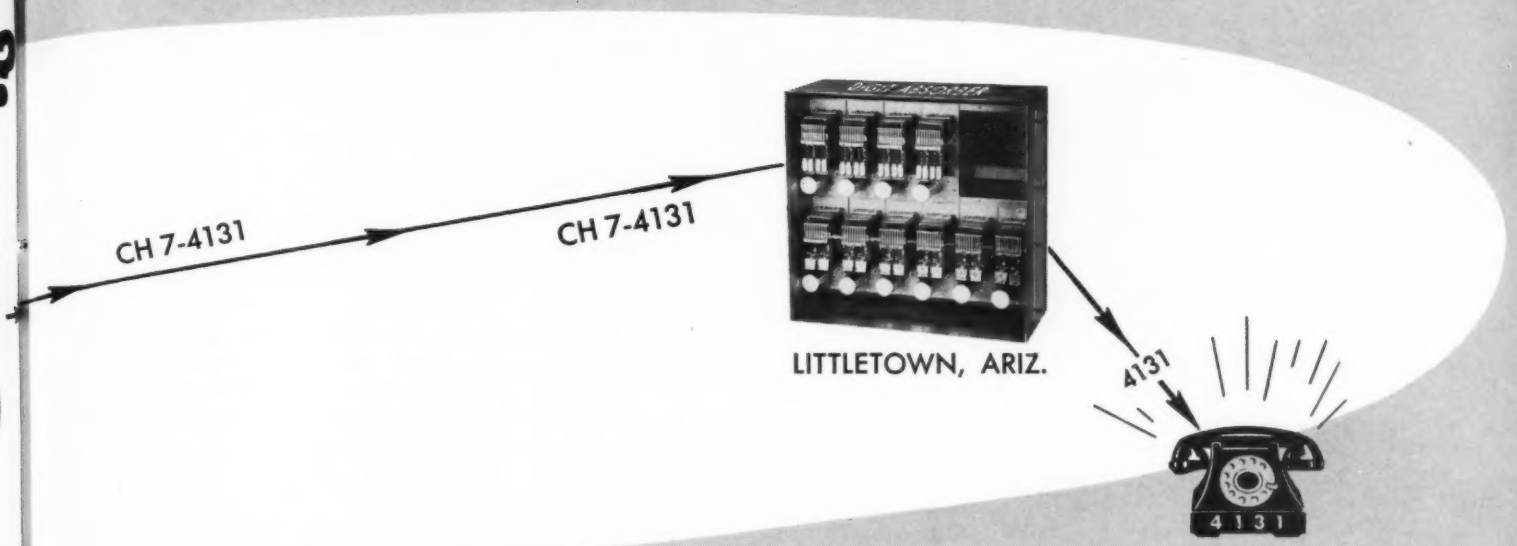
It can with a UNIVERSAL DIGIT ABSORBER*



DIRECT DISTANCE DIALING REQUIRES A 2-5 CODE

The nationwide dialing plans for operator and direct distance dialing require that all stations be recognized by a 2-5 code. Few dial switchboards of earlier design have provisions for adding digit absorbing features economically. The Universal Digit Absorber fills this need easily and at nominal cost. Installation requires very little time.

The ever-increasing requirements of Extended Scope Dialing on a universal numbering arrangement are easily handled by the Universal Digit Absorber. The Digit Absorber is a factory assembled, fully-wired, applique unit that can be added to any existing dial switchboard to pad in three digits of exchange code (ABX) or four digits in the case of a small digit dial unit.

There are two types of Universal Digit Absorbers, depending on the complexity of the exchange codes assigned:

*19-S unit will handle exchange codes, as illustrated by AB-X, where the "X" digit is not a duplicate of the "A" or "B" digit.

*19-L unit is required where the "X" digit is a repeat of either the "A" or "B" digit.

In addition, Universal offers a Trunk Digit Register unit which can be applied to "Trunk on Line" dial units where five or more digits are required to be delivered to a 3 or a 4 digit tributary exchange.

TELEPHONE DIVISION

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1594 SOUTHLAND CIRCLE, N. W. ATLANTA, GA.
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165 PROSPECT STREET PASSAIC, N. J.

*Pat. Pend.

Mail this coupon to the nearest address.

Gentlemen: I am interested in your Universal *Digit Absorber* for 2-5 Numbering.

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Position_____
Firm_____
Address_____
City_____ State_____

T-11-2

DEPARTMENT OF TECHNOLOGY
BUFFALO AND ERIE COUNTY PUBLIC LIBRARY

to improve its earnings still further by arranging its future financing, on a sound basis, by increasing its present low debt ratio of 23.09 per cent to as much as 40 per cent at least.

(2) That all exchanges now exceeding their present group limitations be reclassified into their proper rate group; and that all exchanges exceeding their rate group limitation in the future be automatically similarly reclassified as soon as such excess is established.

Ill. Commission Dismisses City's Rate Complaint

The Northwestern Telephone Co., Freeport, on December 18, 1956 filed with the Illinois Commerce Commission a schedule of rates for service to go into effect on Jan. 18, 1957. The schedule filed was not a general rate increase but included several changes which were as follows:

(1) Increase public paystation telephone calls from five cents to 10 cents.

(2) Remove the additional charge of 25 cents for handset telephones.

(3) Eliminate the 25 cents per month discount and charge the net rate.

(4) Other rate changes for rules and regulations.

The city of Freeport filed a complaint with the commission against the Northwestern Telephone Co. objecting to the increase in local calls from five cents to 10 cents without either official or unofficial notice to said city; that it coerced various business subscribers to remove business telephones and install public paystations, and that the telephone company refused to furnish the city of Freeport a copy of its revised tariff schedule.

The matter recently came for hearing before a duly authorized representative of the commission. The commission, after considering the evidence, was of the opinion and found:

(1) That the telephone company increased charges for local calls from coin box telephones from five cents to 10 cents per call on Jan. 18 with permission of the commission and that no notice was necessary to the city of Freeport.

(2) That the Northwestern Telephone Co. on Jan. 18 revised its tariff schedule with the permission of the commission and that no notice to the city of Freeport was necessary.

(3) That the Northwestern Telephone Co. did not coerce or attempt to coerce business subscribers to remove business telephones and install paystations.

(4) That the Northwestern Telephone did not refuse to furnish the city of Freeport with a copy of its revised tariff and that there was no obligation on the part of the telephone company to provide the city with a copy of its revised tariff.

(5) That the Illinois Commerce Commission has the power to change rates rules and regulations without holding hearings thereon.

(6) That the schedule of rates filed on Dec. 18, 1956 is binding and proper and is effective on the date of the order.

(7) That the complaint and protest of the city of Freeport was unfounded and improper and was dismissed without prejudice.

Dismisses Ark. Bell Bid for Ruling on Franchise Tax

A petition by the Southwestern Bell Telephone Co. to allow it to pass on a $13,000 city franchise tax increase to Pine Bluff, Ark., customers or declare the action raising the tax to be illegal has been dismissed by the Arkansas Public Service Commission, it was reported on Oct. 15 (TELEPHONY, April 27, p. 71).

The dismissal was ordered on the company's own request.

Pine Bluff city councilmen voted earlier this year to raise the company's franchise tax from $12,000 yearly to $25,000. Company spokesmen, in negotiations with the council, claimed the increase amount was exorbitant.

When a compromise agreement failed to be reached and the council took formal action on the increase, the company filed a petition with the commission seeking to have the action set aside as illegal. If the commission had approved the action of the council, then the company asked that it be permitted to pass on the increase to its customers.

It is reported that the commission plans to undertake a study of its own pertaining to occupation taxes imposed on all telephone operations in the state.

Ohio Commission Hears Rate and Securities Cases

The Ohio Public Utilities Commission has taken the following action on rate and securities matters:

The Chardon Telephone Co. has been authorized to purchase 330 shares of the common capital stock of The Thompson Telephone Co. at a stated value of $300 per share.

The Thompson company operates exchanges in Thompson and Montville, and became a subsidiary of the Chardon company on Oct. 10.

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The Home Telephone Co. of Fairview recently withdrew its magneto and switching service in its Fairview exchange following its conversion to common battery service. Rates authorized are:

One-party business	$6.00
Five-party business	4.75
Ten-party rural business	4.75
One-party residence	4.75
Five-party residence	3.25
Ten-party rural residence	3.50

The Fairview exchange serves 338 stations.

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The Ohio commission on Oct. 15 received requests from two companies to eliminate certain charges the companies make for installing home telephone extensions.

General Telephone Co. of Ohio and the Ohio Consolidated Telephone Co., both with headquarters in Marion, requested permission to eliminate charges for extensions when company repairmen or installers are at a home on company business.

Ohio Consolidated also asked permission to eliminate charges for extensions ordered at the same time as regular telephone service. Ohio Consolidated also would charge for only one extension if more than one is ordered after telephone service starts.

The commission approved the Ohio Consolidated Telephone company's "time announcement service." This service is in two categories, one with 12 different announcements per record so arranged as to provide a different message announcement each 10 seconds. The equipment is arranged to permit continuous use with each time-of-day announcement, for such periods as desired, of one designated announcement only from a separate record containing not more than 12 different announcements; and other equipment providing for 12 different message announcements per record so arranged as to provide a different message announcement once each hour, which equipment also provides the time of day at 10-second intervals.

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The Lucas Telephone Co. has petitioned the commission for extended area service to the Mansfield Telephone Co., the county seat, which is located approximately 5 miles away, alleging in the petition that there is a strong community of interest beween the two companies. The Lucas company renders service to approximately 450 subscribers.

Rate Raise OK'd in N. C.

The Saluda Mountain Telephone Co. on Oct. 23 was authorized by the North Carolina Utilities Commission to increase its rates, effective Nov. 1.

Courage Needs Patience

"Fortify courage with the true rampart of patience."—SIR P. SIDNEY.

Kids Swarm to Telephone Display at Hobby Show

FREE TELEPHONE SERVICE
The Belleville Telephone Co. is opening Thursday, May 23 at 2 o'clock. All lines are private lines and the phones are a mixture of antique and modern, crank, common battery and dial. We don't allow calls to or from foreign exchanges. We serve an area of 450 square feet.

No wonder! This is one of the exhibits at the
BELLEVILLE CHURCH HOBBY SHOW

Curiosity aroused by the newspaper advertisement above, the townsfolk of Newburyport, Mass., flocked to a telephone display held recently at a church hobby show. In fact, out of some 60 exhibits, which included various displays of ceramics, weaving, guns and such, the telephone exhibit proved one of the most popular. The older folks were stirred to reminiscence over some of the old models, "Just like the one Aunt Matilda used to have," while the children—well, they were so fascinated at communicating with their friends that "some of them talked as though they had been separated for years, sitting right across the table from each other," reports Hobbyist R. David Thompson, owner of the display.

Last year, says Mr. Thompson, he entered 10 telephones wired in parallel as a display for the grownups. "But I never thought of the kids. Can you imagine five pairs of children trying to carry on their own conversations on one line? Four aspirins, please."

This year he bowed to youth and added to the attractions with an old switchboard, 14 telephones, an old car battery, an army surplus subcycle and odd wire to construct an exchange. To keep equipment and power requirements to a minimum, he used kick coils for the common battery telephones.

He and his wife served as operators, and they were "kept hopping" for a few hours trying to keep ahead of the calls. Says Mr. Thompson: "Personally, I'd say we were busier than I was, operating for a resort exchange at the height of the evening's rush hour."

Mr. Thompson keeps busy at the board.

Left photo. The boys, fascinated by the operation and mechanics of the old fashioned models, "man the phones" with unflagging zeal. Right photo. This small miss, seizing the chance to "ring up a friend," registers wide-eyed interest in some vital point.

Mr. Thompson's collection has grown in 10 years from two bell boxes and a candlestick to about 33 telephones, modern and antique, an AE 20 line dial board, a WE cordless PBX, and many odd parts.

The first five years of telephone hobbying were the hardest, he says, as "I didn't know anything about supply houses and the Independent industry." Reading articles in TELEPHONY, he reports, "has provided much satisfaction, and through the ads I have enlarged my collection, and was able to put on the exhibition."

General of SW's Sherman Exchange Switches to DDD

When the Sherman exchange of General Telephone Co. of the Southwest, which has over 9,000 telephones, switched to Direct Distance Dialing (DDD), it was reported to be the first Independent exchange in the state of Texas equipped to permit its subscribers to dial their own long distance calls.

At the same time Sherman was cut to DDD, the exchange was converted from common battery to automatic, and microwave service was inaugurated.

According to E. H. Danner, president, the company is extremely pleased with use of the new subscriber long distance dialing service which is available from Sherman to eight other Texas cities: Dallas, Fort Worth, Denison, Denton, Gunter, Gainesville, McKinney, and Pilot Point.

At the time of conversion approximately 40 per cent of the average number of long distance calls placed daily from Sherman went to one of the eight cities included in the Direct Distance Dialing set up. Figures available since conversion reveal that there has been a 12 per cent increase in the number of calls placed to these points.

An extensive customer and employe DDD educational program was conducted by key personnel preceding the conversion.

Mr. Danner emphasized the fact that a continuing educational program is planned through the schools, newspapers, and programs at clubs to increase the subscribers' usage of DDD and station-to-station calls. He added that three other towns in the Sherman area, Bonham, Ector and Howe, will be added to the list of towns included in the Sherman Direct Distance Dialing set up in November; and other towns will be added in the future.

Sherman is the fifth largest of General of the Southwest's 264 exchanges in the five-state area of Texas, New Mexico, Oklahoma, Arkansas and Louisiana. Approximately 1.5 million dollars was spent by the company to install the automatic and SATT equipment and the microwave installations which increased long distance facilities between Sherman and Dallas, Denton, and Fort Worth.

Lincoln T&T Gets Approval Of Dialaphone Rates in Neb.

The Nebraska Railway Commission on Oct. 4 authorized The Lincoln Telephone & Telegraph Co. to provide automatic dialing equipment at $5.00 per month (TELEPHONY, Oct. 12, p. 50). Installation is $5.00 and inside move $1.00.

The Dialaphone instrument permits automatic, push button dialing through use of an indexed directory tape on which 850 telephone numbers may be punched.

construction and maintenance DIGEST

- **Insure your power**
- **Supersonic splice**
- **Indoors or out**
- **Country-style thrift**

Published regularly to help you get the most out of your materials and supplies dollar

by John W. Garbutt, Inside Sales—Rochester

As a volunteer fireman I have to be alert at all times, just as Stromberg-Carlson is always alert to meet your supply needs. We're "on the job" for you 24 hours a day—because telephony is our full-time job, not just a sideline. Every order we fill for you brings you fine products, protected by a double guarantee —ours, and the maker's. And the attention given to your order is as careful as if our total program depended on it—because it does! Your supply business makes possible the research program that discovers new and better telephone equipment—to serve you. It's a pleasure to be working with you—we sincerely appreciate your support!

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Because Planté batteries practically last forever...providing stand-by power that never fails...they're the best operating insurance you can buy. In switchgear, signal and alarm systems, or emergency light and power applications, these lead batteries have rolled up amazing performance records . . . are famous for their ability to deliver a powerful surge or a steady flow of current the instant it's needed. Make sure you're in operation . . . always. Choose Gould Planté.

Ask your Stromberg-Carlson representative about long-life stand-by power with Gould Planté.

A sure, dependable supply of power when you need it. That, briefly, is the story of this Gould Planté battery.

High-speed splice outlasts the wire itself

You can cut half the time off splicing wires—and get a splice that will actually outlast the conductor itself!

Available for all types of wire: Nicopress sleeves. Special Nicopress tool is easy to use.

Because it is stronger than the rated breaking strength of the wire, you just can't pull apart a joint made with the Nicopress sleeve. It will withstand the toughest strains of vibration, yet makes a neat, compact splice that you can use on drop or inside wires as well as other lines. A tough inner alloy lining—harder than either the sleeve or the conductor – is the secret of Nicopress sleeves' strong grip.

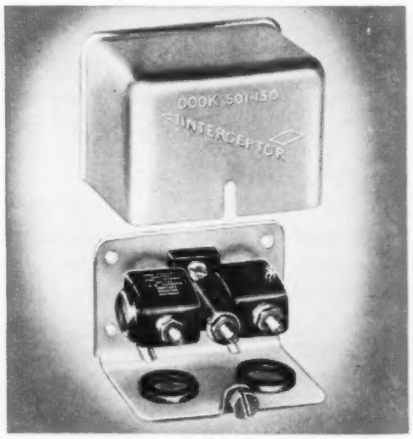
To apply Nicopress sleeves quickly and simply, use the Nicopress tool, which is specifically designed to work together with the sleeves for high-speed splicing.

For indoor or outdoor use

Enjoy greater economy with the "Interceptor" fuseless substation protector, made by Cook Electric Company for use at subscriber stations where the omission of fuses is sanctioned by the National Electric Code.

The unit consists of a Bakelite base with heavy terminal and ground studs. Both line circuits are protected by Cook Minigap or Mytigap protectors.

The "Interceptor" can be used indoors or out. Indoors it mounts directly in a convenient location.



Fuseless Substation Protector.

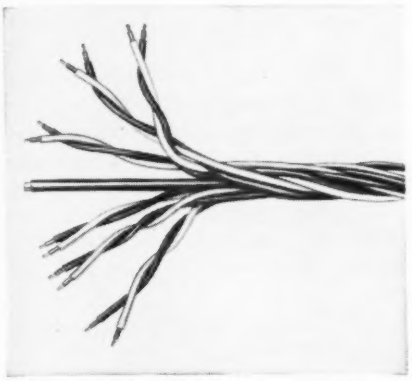
Outdoors it is fitted with a mounting bracket and cover for home, pole or cross-arm installation.

For outdoor mounting the "Interceptor" is fully enclosed in an all-metal weatherproof housing with neoprene grommets which seal the dropwire and ground entrance.

For economy *plus* protection, order from your Stromberg-Carlson representative.

Rural Distribution Wire Gives Speed Plus Economy

For fast, low cost construction specify Ansonia Lightweight Rural Distribution Wire.



Ankoseal Rural Distribution Wire Ideal for Temporary Service or Cable Relief

It comes with plastic-insulated #19 A. W. G. soft copper conductors in color-coded pairs, which are cabled around a polyethylene-insulated .109 high strength galvanized steel support wire. Each conductor pair has a controlled different length twist to avoid crosstalk.

A breaking strength of 1800 pounds makes this Ansonia Wire & Cable Company product ideal for temporary service or cable relief.

Your Stromberg-Carlson representative can offer prompt delivery on your order.

Did you know . . . that Stromberg-Carlson warehouses and handles thousands of items in the field of construction and maintenance supplies alone? You can do *all* your business "under one roof" and find the same quality and reliability in every item.

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IN THE NATION'S CAPITAL

Concluded from page 18

business enterprises not subject to public regulation. Is that good? Evidently the department attorneys think so. Con-Consider their contention that private business operations, which have always been conducted on a contractual basis, should not be subject to public regulation or otherwise converted into public utility enterprise. If we turn the history pages back about three-quarters of a century we can hear the operators of a grain elevator in Illinois making the same kind of argument before the Supreme Court to avoid regulatory control by the state of Illinois. The highest court thought otherwise in that celebrated case.

The fact is that mobile radio-telephone operations which are subject to commission regulation are more likely to protect the broad public interest than if the same operations were conducted *without* regulation, under private contract between two private business organizations. Public interest in regulation is protected by a number of ways. Telephone company rates are controlled. Clients for mobile radio-telephone service would be assured of a reasonable rate and if they felt otherwise they could complain to the regulatory authority and have the rates changed if they could prove their case. Regulated telephone companies also have a service obligation which private companies do not have. Again, if the service obligation is not fulfilled, there are regulatory disciplines to force fulfillment. Again, this is not the case with private company operators.

The broadest argument, of course, telephone companies make in this controversy has to do with the conservation of the radio spectrum. When telephone companies make use of a radio frequency, they are able to make full use of it around the clock, by reason of the nature of their facilities. Private companies might make only sporadic use of such frequencies, or even fail to use them at all for considerable periods. No one could complain.

And, so, this important case shapes up before the FCC involving all three of these very significant areas of controversy: (1) Monopoly versus competition; (2) the economic implications of permitting a utility company to engage in supplemental service operations by merchandising activities; (3) regulated public services by telephone companies as distinguished from unregulated service under contract between private companies (to which the government is not a party and over which it has no control).

And, we must not lose sight of the important consideration that future developments might well merge mobile radio-telephone service into integral connection with conventional telephone service. At present, pipeline employes or taxicab employes, using mobile radio talk only with each other, but in the future it may well be that direct connections will have to be made to telephone company facilities. If the FCC were to bar the telephone industry from this field at this time, such a transition might be very difficult to encompass in the future.

It has been pointed out that the telephone industry has an obligation to render two-way voice communication service whenever, wherever, and however it is possible. As the retiring president of the USITA, Donald C. Power, said in his address before the 60th annual convention of that group last month in Chicago: "There are those who argue that the telephone industry should be confined to a conventional station-to-station operation and that these newer forms of communication service should be denied to our industry. Needless to say, we do not accept that view. We consider the telephone business, not as a static art, but as a dynamic service which should be permitted to expand in scope as new technical facilities and practices become developed."

New England Bell Wins Raise in Rhode Island

The Rhode Island Public Utility Administration on Oct. 15 granted the New England Telephone & Telegraph Co. an increase in Rhode Island rates amounting to about half of the $2,925,000 annual raise the company asked a year ago (TELEPHONY, Dec. 15, 1956, p. 37).

Administrator Thomas A. Kennelly dismissed the proposed rates filed by the company on Nov. 26, 1956, and ordered it to file within 15 days a revised schedule of rates that will increase gross intrastate revenue by $1,400,000 annually.

This, according to Administrator Kennelly, would give the company a return of 6.25 per cent on its intrastate rate base, instead of the 7.25 to 7.75 per cent it had asked. In the last Rhode Island rate case in 1953, Mr. Kennelly fixed the fair rate of return at 6.23 per cent. The company actually earned 5.17 per cent in the first seven months of 1957, it was noted.

REA APPROVES LOANS IN 11 STATES

Continued from page 19

The existing automatic facilities at Elrosa will be retained in the expanded system, a new automatic office is scheduled at Belgrade.

Total loans to the Minnesota Central Telephone Co. amount to $1,145,000, with which it will be able to furnish new and improved service to 2,733 rural subscribers. The system will consist of nine exchanges of which the Cosmos, Hector, Kandiyohi, Lake Lillian, Palmyra, Raymond and Svea are in operation, serving about 2,000 subscribers.

Alfred L. Ericson is president and Harold L. Ericson is manager of the Minnesota Central Telephone Co.

•

Parsons (Tenn.) Telephone Co.; $202,000 loan (Oct. 11).

The borrower plans to use the loan to furnish new and improved service to 261 farm families and other rural subscribers. The company proposes to acquire access rights to the area served by the Sardis Telephone Co. and furnish subscriber service to 30 switchers of the Decaturville Telephone Co. The company at Sardis now provides magneto service for 147 subscribers of which about 130 are expected to take service with the borrower. A new automatic central office is scheduled at Sardis.

The borrower also plans to purchase its presently leased building in Parsons, and to remodel it to house both automatic and headquarters facilities.

Total REA loans to the borrower of $812,000 will finance new and improved service for 1,614 rural subscribers. Automatic central offices will be located at Parsons, Sardis and Scotts Hill.

T. D. Odle is president and manager of Parsons Telephone Co.

•

Northeastern Telephone Corp., London, Ky.; $785,000, second loan (Oct. 15).

The borrower will use the funds to bring service to 1,092 rural subscribers. The two REA loans, totaling $3,743,000, will make it possible for Northeastern to furnish new and improved service to 7,842 subscribers. The system will consist of 11 exchanges of which Augusta, Germantown, Johnsville, Manchester and Mt. Olivet are in operation. The remaining exchanges will be located at Barbourville, Brooksville, East Bernstadt, Flat Lick, London and Oneida.

LeRoy T. Carlson is president and Perry D. Woodward general manager of the Northeastern Telephone Corp.

•

Concordia (Mo.) Telephone Co.; $456,000, first loan (Oct. 15).

The borrower plans to improve telephone service for 909 existing subscribers and to furnish initial service for 91 farm families in its area. At present the Concordia company provides common battery and magneto service.

A new combination automatic central headquarters building which will include garage and storage space is scheduled at Concordia.

Earl C. Ewer is president and manager of the Concordia company.

•

Granby (Mass.) Telephone & Telegraph Co., $18,000, fourth loan (Oct. 16).

The borrower will use these funds to complete the system previously authorized. Provision is also made for an increase in the proportion of private and semi-private lines.

With the four REA loans, totaling $282,000, the borrower will offer new and improved service to 795 rural subscribers. At present the company is furnishing automatic service to approximately 750 subscribers.

Alston D. Mugnier is president and manager of the Granby company.

•

Breezewood (Pa.) Telephone Co., $146,000, second loan (Oct. 16).

The borrower plans to bring telephone service to 292 rural families not included in the first loan.

The two REA loans, totaling $510,000, will make possible new and improved service to 1,052 rural subscribers. The system will consist of exchanges at Breezewood, New Grenada and Warfordsburg.

Walter C. Nave is president of the Breezewood Telephone Co., and Howard Nave is manager.

•

Wyoming Telephone Co., Inc., Pinedale; $135,000, first loan (Oct. 17).

The funds will improve service for 159 rural suscribers and furnish initial service to 56 farm families. The company plans to acquire magneto telephone facilities now serving those communities. A new automatic central office will be constructed at Big Piney to

serve the whole area. The 215 rural subscribers who will benefit from this loan includes 30 switchers.

In addition, the company expects to purchase the Pinedale Telephone & Telegraph Co. which furnishes automatic service to 387 subscribers. A portion of this loan will be used to refinance present indebtedness.

Earle F. Crandall is both president and manager of the Wyoming Telephone Co.

•

Ben Lomand Rural Telephone Cooperative, McMinnville, Tenn.; $481,000, third loan (Oct. 18).

The borrower will furnish new and improved service to 547 families and other rural establishments, including 296 farm families now without telephones.

The borrower proposes to acquire the Centertown Telephone Co. and the Dibrell Telephone Co. around which to build the new service. New automatic offices will replace the present magneto facilities at Centertown and Dibrell.

The three REA loans, which total $2,696,000, will make it possible for the borrower to offer new and improved service to 5,359 subscribers. Thirteen of the proposed 15 exchanges are in operation, serving approximately 2,300 subscribers.

R. B. Miller is president of the Ben Lomand Rural Telephone Cooperative and William S. Slusher is manager.

INDEPENDENT PIONEERS

Concluded from page 28

Elsie Wilson of La Grange, Ind.; Walter Neave of Augusta, Ky.; R. E. Putnam of Muskegon, Mich.; H. E. Holland of Ronan, Mont.; J. M. Wilson of Jamestown, N. Y.; R. H. Learned of Elizabeth City, N. C.; F. J. Micka of Tulsa, Okla.; L. E. Grandy of Johnstown, Pa.; Eunice I. Fuller of Groton, S. D., and Tommie De Hay of Brownwood, Tex.

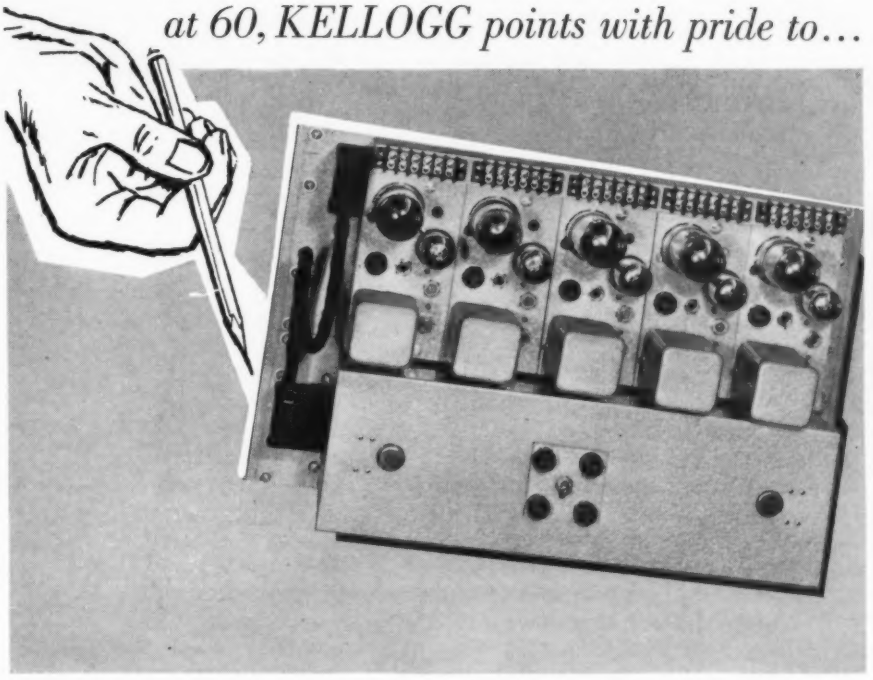
Alabama Company Requests Increase in Rates

The Alabama Public Service Commission said on Oct. 24 it was giving further study to a petition seeking approval of new rates for the cities of Camden and Thomaston, as filed by the Southland Telephone Co., Atmore.

Company officials said Thomaston already is receiving automatic equipment and Camden will be given similar service in 1958.

It was announced also that additional telephone service will be extended to rural communities in Wilcox County including the Coy community which never has had telephone service.

at 60, KELLOGG points with pride to...



AN ELECTRONIC RINGING GENERATOR THAT ELIMINATES CROSS-RING PROBLEMS

KELLOGG ELECTRONIC RINGING GENERATOR . . . Less maintenance . . . No moving parts . . . No contacts to clean or replace. Plug-in components . . . Not damaged by shorted lines . . . Experience proves tube life normally exceeds 18 months. No Cross-Ring problems . . . Extreme frequency stability . . . precise, easily adjustable frequencies. Flexibility . . . provides any combination of 5 or fewer ringing frequencies. All ringing frequencies are independent of each other and/or frequency of power source. Efficient . . . all frequencies continuously available . . . furnishes enough power for 1000 or more lines. Compact . . . mounts on standard 19″ relay rack . . . requires only 12¼″ of vertical space.

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TELEPHONY'S TRAFFIC ENGINEERING HANDBOOK

Concluded from page 32

Connector Type	Use
Non-Hunting	
One-ring, local, toll or combination.	Individual flat rate, message, coin, two-party and one-ring four-party.
Two-ring, local, toll or combination.	Four-party, two-ring (also individual, message, coin and two-party.
Ten-party, T/S, local, toll or combination.	Ten-party (rural service).
Ten-party, T/L, local or toll.	Ten-party (rural service).
Rotary Hunting	
One-ring, local, toll or combination.	Smaller PBX groups and consecutive groups of individual lines arranged for terminal hunting.
Level Hunting	
One-ring, local, and toll	Large PBX groups.

To determine connector requirements, we shall assume:

Number of working lines..... 1,400
Busy hour CCS load..... 2,576
Lines per group..... 90

2,576 CCS ÷ 1,400 lines = 1.84 CCS per line.

1,400 lines ÷ 90 assigned lines per group = 15 groups, leaving 50 lines not accounted for.

90 lines per group × 1.84 CCS per line = 166 CCS per group.

50 lines per group × 1.84 CCS per line = 90 CCS per group.

166 CCS, according to the accompanying Connector Capacity Table, calls for 10 connectors and 92 CCS calls for seven connectors.

And, so, the requirements for the office would be:

15 groups of 10 connectors each (15 × 10) = 150
1 group of 7 connectors (1 × 7) = 7
16 groups — Total required connectors 157

Should the developed CCS for a group exceed the capacity for 10 connectors, the requirements may be developed in the following manner:

The Connector Capacity Table shows that 10 connectors can handle a load of 166 CCS per group.

We shall assume:

96 lines per group.
2.05 CCS per line.

96 lines × 2.05 CCS per line = 197 CCS for the group.

There are two solutions available:

(1) 166 CCS ÷ 2.05 CCS = 80 lines, leaving 16 lines to account for. Therefore, 16 lines from this group should be reassigned to a lightly loaded group or a new group.

(2) From the Connector Capacity Table, we find that 197 CCS calls for 12 connectors. And, so, two connectors should be added to the group.

The number of connector terminals for the initial period is usually from 5 to 10 per cent greater than the number of working lines. These spare terminals are called for because:

(a) There will be terminals which must be placed on intercepting service, due to directory changes, growth in PBX groups and other changes. (The extra terminals should be approximately 10 to 20 per cent for PBX groups and 5 to 10 per cent for other groups.)

(b) Terminals required for testing purposes. (One for each 100 terminals, or fraction, with the exception of PBX trunks. These will need two terminals for each 100 lines.

(c) Terminals needed to care for night PBX listings, etc.

(Section 6 to be continued next week)

Microwave Network Being Built Across Canada

A row of steel towers, spaced like a giant's footsteps, is being erected across Canada from the Atlantic to the Pacific oceans. The towers march through populous cities, across the barren land of the Canadian Shield, through the prairies and the high ranges of the Rockies, spanning the continent from Sydney, N. S., to Victoria, B. C.

Each tower stands alone on a hilltop or on a tall building; the tip of each is in direct line-of-sight range of the tip of the next tower in the series, 25 to 30 miles in the distance.

This is Canada's new microwave radio relay system, a chain that, when completed next year, will make possible a trans-continental television network and will provide a large supply of circuits for long distance telephone calls.

The supply of telephone circuits will hasten the program of Direct Distance Dialing (DDD), under which operators initially—and customers eventually—will dial directly to telephones anywhere in Canada or the U. S.

The system will also provide special facilities such as teletype, telephoto, telegraph, and telemetering circuits.

The microwave system is regarded as one of the most significant advances in the history of Canadian communications, and ranks among the major undertakings that have characterized Canada's postwar growth.

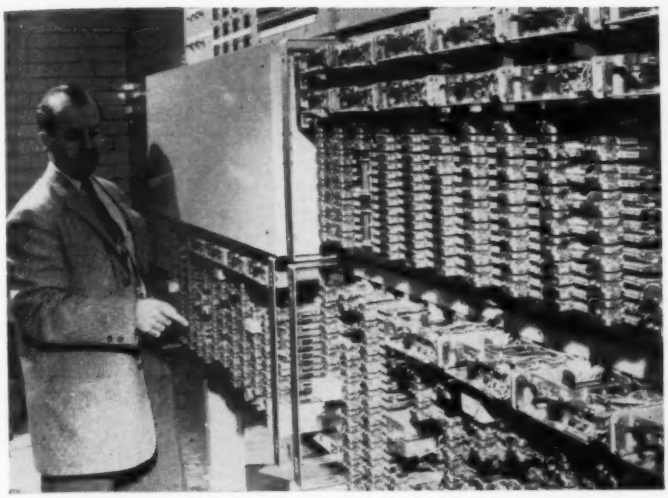
The total cost of the system is estimated at 45 million dollars to 50 million dollars. It is being financed by Canada's seven large telephone companies grouped together in the Trans-Canada Telephone System.

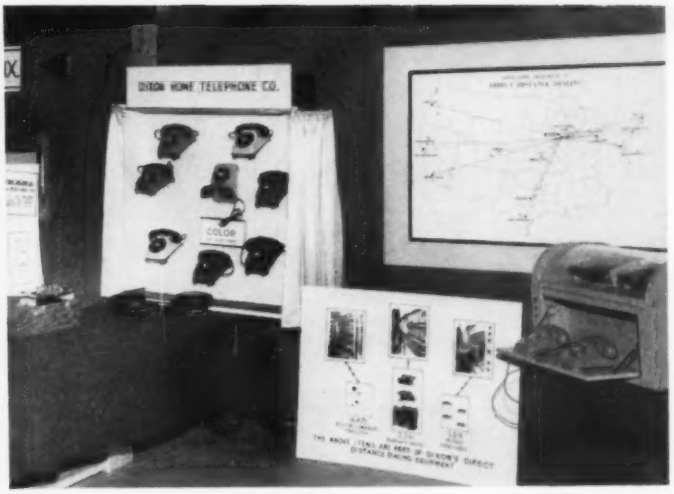
When the basic network is completed, it will include 139 relay points (each one costing about $300,000) and will extend 3,900 miles, making it the longest single microwave system in the world. Spurs to cities not served directly by the main line will total an additional 550 miles, and will require 28 more relay stations.

Ultimate capacity of the system is 12 one-way channels. A pair of channels will accommodate 600 telephone conversations, while almost the whole of one channel is needed to carry a single television program.

Construction of the microwave network started in 1953 when the Bell Telephone Co. of Canada opened a 340-mile system between Toronto, Ottawa and Montreal, later supplementing the network with a 70-mile extension to Buffalo to connect with U. S. television networks.

Now, the system is in operation from Quebec City, through Montreal, Toronto, North Bay, Fort William and Winnipeg, to Regina, with spur lines to several other centers. Edmonton, Calgary and Lethbridge will be connected to the chain in November, this year, while the Maritime section—which already links Sydney, Halifax, Saint John and Moncton—will be added to the national system in January, 1958, upon completion of the Quebec City-Saint John connection. The final link, Calgary to Vancouver, will go into service about mid-1958.





LEFT PHOTO: Delroy C. Long, wire chief at Dixon Home Telephone Co., points to register-sender equipment of XY toll ticketing system now bringing full Direct Distance Dialing (DDD) to this Illinois city. RIGHT PHOTO: Direct Distance Dialing (DDD) was main feature of a display by the Dixon company at a local industrial show. Connections shown are typical of the hundreds of cities now being dialed direct by subscribers in Dixon.

DDD Improves Service, Revenues at Dixon, Ill.

The first six months of customer Direct Distance Dialing (DDD)—in full operation at Dixon, Ill., since May 5 of this year — have proved conclusively that the system provides better service for subscribers and improved earnings for the company, according to F. S. Coakley, manager of the Dixon Home Telephone Co.

Mr. Coakley is delighted with results thus far and fully expects a very sizeable increase in customer-placed toll calls as soon as the Illinois Bell Telephone Co. has converted its exchange in the neighboring city of Sterling, Ill.

Subscribers have taken to the idea of dialing distant calls very well, placing 6,226 calls during the month of August, and in so doing have relieved pressure on the Dixon toll operators so that a smaller number can now render greatly improved service on those calls requiring operator assistance.

Carolina T&T Installs DDD At Washington Exchange

From the "Original Washington," said to be North Carolina's first Direct Distance Dialing (DDD) exchange, the initial telephone call was made on Oct. 16, when Lieutenant Governor Luther Barnhardt dialed the North Carolina Utilities Commission chairman, Stanley Winborne, in Raleigh. The call was televised by station WITN at Washington, an exchange of The Carolina Telephone & Telegraph Co.

The first call marked the beginning of a new era in communications for citizens of Washington as well as those in nearby Bath, Belhaven and Aurora. Next day, local citizens began dialing many long distance points from their telephones without operator assistance.

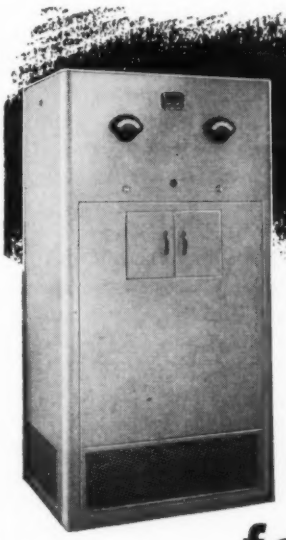
The expansion and improvement program at Washington has involved an expenditure in excess of 2 million dollars.

Good Reason for High Aims

"Aim at perfection in everything, though in most things it is unattainable; however, they who aim at it, and persevere, will come nearer to it than those whose laziness and despondency make them give it up as unattainable." —CHESTERFIELD.

Conversational Charm

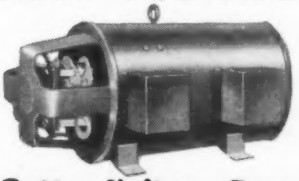
"The great charm of conversation consists less in the display of one's own wit and intelligence than in the power to draw forth the resources of others."—BRUYERE.



ADD A FLOTROL

TO YOUR

ROTARY EQUIPMENT



for: • Better Voltage Regulation • Sizeable Power Bill Savings

A telephone exchange now using DC generators for charging the batteries can add one or more FLOTROLS and immediately obtain the precise voltage regulation characteristics of the FLOTROL for the entire exchange. The high efficiency of the FLOTROL will greatly reduce power consumption during those hours of the day when the FLOTROL alone is sufficient to carry the entire load; generators can be shut off during light load periods, thereby reducing the wear on the rotating equipment. By installation of FLOTROL capacity sufficient to carry the entire normal load, rotating equipment showing signs of wear can be saved for standby service, continuing its life indefinitely. The advantages obtainable from this type of installation are tremendous. For further information, send for Bulletin 161.

FLOTROL — PARTNERS IN DEPENDABILITY — SUB-CYCLE

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ONLY PANCAKE® OVERFLOOR DUCT SYSTEMS GIVE YOU THESE ADVANTAGES

1 No fittings are attached to office furniture — desks are not marred and are free to move to new locations at any time.

2 Lowest ramp angle and flattest overall height — to provide the most trip-proof raceway, and smoother movement of equipment on wheels.

3 The raceway is capable of carrying greater weights *without losing the mechanical grip* between base and cover.

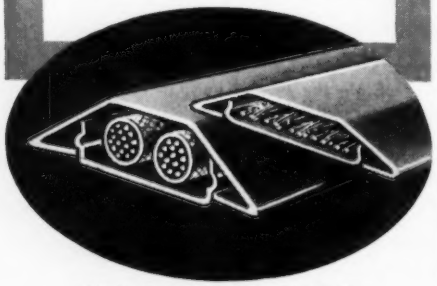
4 Raceway cover fits positively over base—a definite "snap" indicates that the cover is secure, without any doubt.

5 Twistouts in fitting covers conform to the raceway — there are no unsightly gaps that collect dust and grime.

6 Fitting covers are easier to line up and attach, because screws are fastened *vertically* to *threaded bushings* in base.

7 Raceway base and cover *both* fit snugly into fittings — a positive stop for each assures no slipping at any time.

8 Bases and covers for raceways and fittings are made of galvanized steel — for maximum resistance to corrosion.



Write for NEW Data Sheet H7

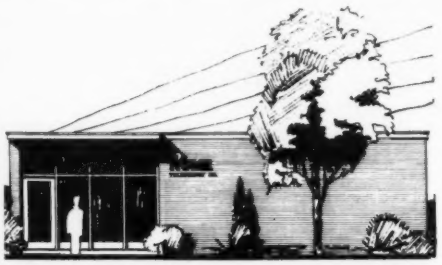
THE WIREMOLD® COMPANY

HARTFORD 10, CONNECTICUT

News on New Products

PACKAGE PLAN FOR EXCHANGE BUILDING—A recently developed package plan whereby working drawings and complete telephone building specifications may be obtained for a fraction of the usual cost is now available, Stromberg-Carlson Co. announces.

Great flexibility in both floor plan and exterior design was the primary objective in developing these dial exchange building plans. The structure may be specified as with or without



office facilities, in sizes to accommodate from 200-1200 lines, and using any one of seven exteriors to meet individual taste and harmonize with neighboring buildings.

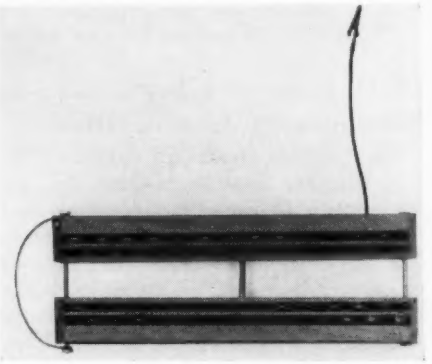
Cavity-type wall construction offers advantages of dead air space for insulation (see cut); metal-reinforced walls insure stability and permanency of masonry construction, according to Stromberg-Carlson. The entire building is constructed on concrete footings.

The company states specifications include everything which a general contractor needs, including electrical and hardware accessories, heating and lighting equipment—all cross-referenced with alternate suppliers' part numbers. Construction materials are chosen from those generally available; the design is functional and totally fireproof.

Further details of this building plans package are contained in a 12-page brochure. Ask for NP738.

•

ONE-MAN TERMINAL STUB TESTER—A new one-man terminal stub tester has been announced by Murphy Engineering Laboratories.



The company reports the new tester will save one man-hour on each 50-pair lateral where two 26-pair terminals cover the entire complement. It is instantly adjustable to fit either the type NC-26 or NF-26 terminals and can be built to fit any terminal. It can be applied in 15 seconds.

This instrument has already been field-tested and is available for delivery within 30 days from order, the company states. Request NP739.

TELEPHONY PUBLISHING CORP.
608 S. Dearborn St.
Chicago 5, Ill.

Please have the manufacturer send me without obligation the literature indicated by the following numbers:

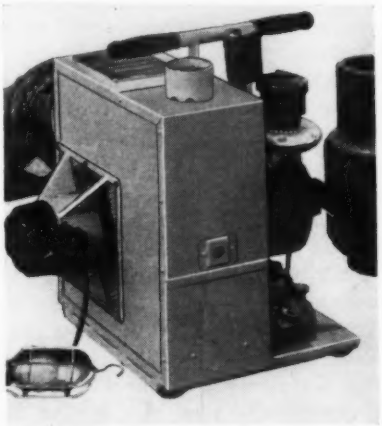
NP738_____; NP739_____; NP740_____; NP741_____;
NP742_____; NP743_____; NP744_____; NP745_____;
NP746_____; NP747_____; NP748_____; NP749_____.
NP750_____.

Name..... Title.....
Company.....
Street.....
Town and State.....
11/2/57

DEPARTMENT OF TECHNOLOGY
BUFFALO AND ERIE COUNTY PUBLIC LIBRARY

UNDERGROUND VENTILATING HEATER—Morrison-Pelsue Co. has added a new model to their line of underground ventilating heaters.

The model PE-G is a propane-fed ventilating heater for manholes, with a generator attached capable of providing 160 watts of power. This innovation provides manhole crews with a simultaneous electric heating and electric lighting and capabilities for using a 100-watt soldering iron.



The PE-G blows from 300 to 800 cfm of fresh air in summer and heated fresh air in winter. The company states the burner is capable of providing a 96-degree temperature rise, thus enabling splicers to work fast and efficiently in the hole despite zero weather outside.

Best suited for telephone, telegraph, electric, water and gas utilities, the PE-G affords a high degree of safety for underground workers. The controlled flow of surface air prevents accidents due to explosion, toxic gas poisoning and heat stroke, according to the company.

Other models are available using ac or dc current and powered with a Briggs-Stratton engine. The PE-G weighs 74 pounds and is equipped with a carrying handle. Request NP740.

•

FILING SYSTEM—Kard-Up, a new filing system that combines the advantages of vertical and visible record-keeping, has been developed by Remington Rand Division of Sperry Rand Corp., originators of the Kardex visible filing system.

Uniquely designed Kard-Up folders make it possible, for the first time, to use the visible signal system of Kardex with a vertical card file. Available in 6-by-4 card size, punched-card size, and 8-by-5 card size, the Kard-Up folder has a transparent Transoloid plastic strip across the top, and die-cut flaps at the base that permit the title card, when inserted under the plastic strip, to be elevated almost half an inch above other cards in the folder.

BISHOP...

Producer of World Famous

BI-SEAL

(The Electrical Tape With A Memory)

Offers 5 Electrical Tapes for Moisture Sealing, High-Voltage Splicing, Jacketing, Insulation Build-Up, and All-Purpose Taping.

FOR PERMANENT MOISTURE SEALING

Bi-Seal Self-Bonding (polyethylene based) Electrical Tapes. Water absorption as low as .0065%. Operating temperatures range from –55°C. to 85°C. Power factors are .0006 and .0021 for 1000 cycles.

FOR HIGH-VOLTAGE CABLE SPLICING

No. 30 High Voltage Splicing Tape. Developed especially for splicing cables insulated with ozone-resistant compounds and operating at 2000 volts or more. Superior ozone and corona resistance.

FOR PERMANENT CABLE JACKETING

Bi-Prene (neoprene) Jacketing Tape. For splicing neoprene-sheathed cables. Protects against ozone, heat, moisture, sunlight, oil, grease, hydrocarbons and chemicals, particularly acids. Flame resistant.

FOR RAPID INSULATION BUILD-UP

No. 125 Electrical Filler Tape. ⅛" thick insulating compound in tape form. Easy to mold to any shape. Fuses to a solid, flexible mass. For cable splice build-up, covering sharp cornered connectors, padding bus bars, cable end sealing.

FOR GENERAL INSULATING AND JACKETING PURPOSES

Vinyl Electrical Tapes. Thin, tough pressure-sensitive tapes with great adhesive strength. Offer complete electrical and mechanical protection for most general taping problems. Highly elastic. High dielectric strength.

Write for complete catalog information.

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CHOICE OF EXPERIENCE
1. BASHLIN Quality Tool Buckets . . . (Built to Last Longer) The original Fibre Top Buckets
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5. BASHLIN Body Belts with additional Nylon Safety Feature
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IN CANADA: A. B. Chance Co. of Canada Ltd. Toronto

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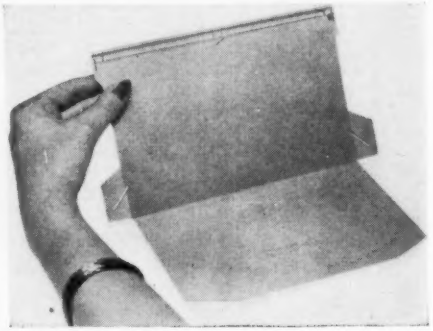
CATALOG NO. 156

W. M. BASHLIN CO.
GROVE CITY, PA.

Transparent signals may be inserted under the plastic strip, providing instantly-read, visible-tip signalling. At the same time, all records related to the title card, ordinarily kept in separate



files, are "floating" in the folder, readily available for posting. This creates a complete operating record in one place—a permanent home for each account.

The Kard-Up folder may be converted to a guide by folding and locking the front flap against the back of the folder, again inserting the title card under the plastic strip and into the die-cut flaps. Thanks to the visible feature, the guides are automatically self-indexing, the company reports.

Kard-Up folders or guides are filed in portable trays with front and back walls slanted outward to provide a perfect working "V." Graph-A-Matic guides, inserted at the rear of each tray, provide visible tray indexing and a master scale for speedy reference to signal positions on individual folders. Housing for the system, which include the electrically powered Kard-Veyer and Conve-Filer, offer a choice to meet any filing need.

The system accommodates nearly all types of records, including accounting, inventory equipment, personnel, and service. Kard-Up is used to advantage for manually prepared records, as well as those resulting from punched-card or Univac "Print-Outs."

A six-page illustrated folder describing the system may be obtained by requesting NP741.

•

ELECTRONIC DATA PROCESSING GUIDE—Remington Rand's Univac division has announced publication of a fast-reading, 36-page guide to the electronic data processing system, written in non-technical, layman's language.

Called "How the Computing System Works for You," the illustrated booklet is the first in an educational series designed to clarify the "mysteries" of electronic computers to high school and college students, as well as to laymen in all walks of business and industry.

Taking the reader on a literary tour of the Univac Electronic Computing Center in New York City, Chapter one of the booklet describes the units of the system, how each works, and typical applications.

The techniques by which man uses the computer along with much of the data processing jargon are explained in the second section. Programming, the survey, process charts, flow-charts, instruction codes are explained simply and clearly. Here, too, is the story of how almost all of us today enjoy the benefits of the electronic computer.

The circuitry of the computer is made meaningful in the next section with illustrated description of how an elementary computer can be made for less than a dollar, using only mechanical switches, a flashlight battery, bulb, and wire.

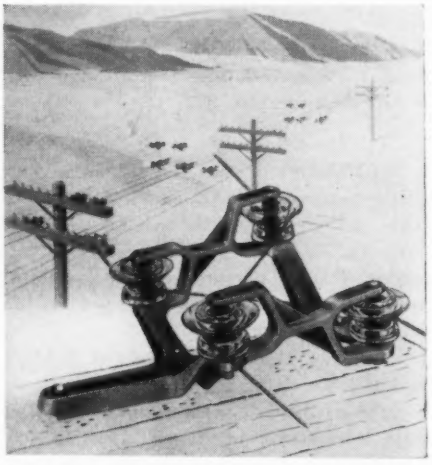
The final sections are devoted to matters of language. Section four explains the meaning of the binary number system, the language of the electronic computer.

The last chapter tells of dramatic advancements now being made in computer operation by the use of automatic coding.

One system described, developed by Remington Rand Univac researchers, makes it possible to instruct the computer with English sentences, virtually eliminating the tedious preparation of coded instruction lists. Request NP742.

•

TRANSPOSITION BRACKET—The Case aluminum cross-arm transposition bracket now has an extended mounting slot which fits all standard 12-inch and 8-inch pin spacings. This extended slot eliminates the need for costly re-boring



whenever a new carrier circuit design calls for a reduction in wire spacing from 12 inches to 8 inches, thus affording the customer considerable savings, the company states.

This improved design will replace the original case cross-arm bracket as it

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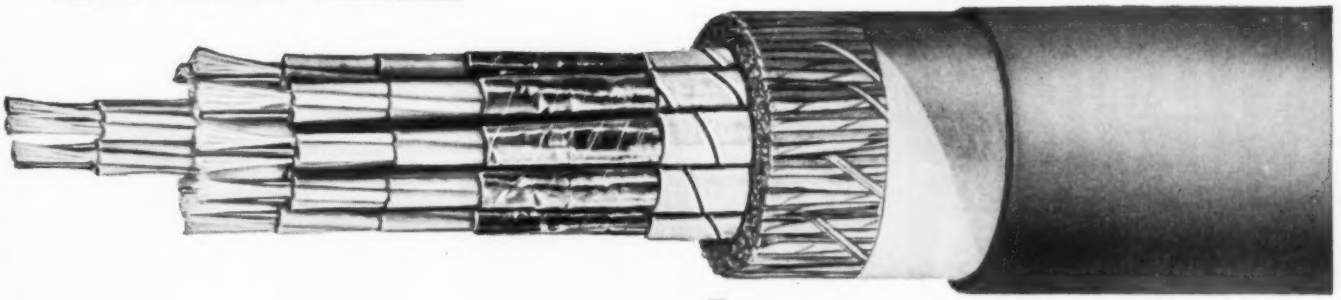
UNIVERSAL FREQUENCY-RANGE CABLE

TO COVER PRESENT DAY COMMUNICATION SPECTRUM



VIDEO PAIR

Balanced broad band transmission circuits* for video and carrier—closed circuit TV—links to microwave stations —remote TV pickup—digital data transmission.

*Low signal to noise ratio
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Telephone circuits.

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Aluminum Lead
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for aerial or duct installation

Also available with armor for direct earth burial or submarine use.

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The TRUCO HYDRAULIC DERRICK is simple, safe and easy to operate. One man can position derrick, dig hole and set pole. Live "Middle-Leg" keeps constant pressure on augur...raises and lowers derrick.

Cuts Equipment Costs one-third. Write Truco for more information.

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TEST EQUIPMENT

Locates Trouble FAST

1000 Cycle
TRANSISTOR
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Model J

A Stable power source, for locating trouble in carrier systems and audio equipment.

Self contained mercury battery with operating life over 700 hours.

Pocket size, 2¼"x3"x4", Wt. 10.3 Oz.

STEWART BROTHERS
Division of Instrument Laboratories
Chicago 10, Illinois

offers the same basic features plus the extended mounted slot. Request NP743.

•

COLORED TELEPHONE DISPLAY—Leich Sales Corp. announces an attractive display promoting colored telephones, which is now available to telephone companies.

This display gives the telephone company a selling tool which can be used as a counter card or window display.

Telephone company business offices, store windows, and other heavily travelled places, are suggested locations.

The display features 10 diamond-shaped patches of color that match the hues of Leich's telephones. Three new colors—white, pink, and light blue—are included.

A Leich 100 telephone fits into a cut-out area of the display.

The poster read, "For Gracious Living . . . Telephones in Sparkling Color!" It also requests subscribers to, "Ask At Your Telephone Company Business Office."

Printed instructions on the back of the display explain the simple steps needed to assemble it. When assembled the display is 20 inches wide by 11 inches high.

Telephone companies may obtain the display without charge. Request NP744.

•

EARTH BORING MACHINE—The recently introduced Sterling Prospector earth-boring machine was demonstrated at Elizabeth, Pa., an exchange of Commonwealth Telephone Co.

Distributed by the Wyoming Valley Equipment Division, the Sterling Prospector is especially engineered for telephone utilities and guard rail contractors. Its low initial cost together with its rugged, precisioned engineered features assure economical, long-life pole hole digging, according to Wyoming Valley.

The Prospector's new circular ring and sliding bed allows the augur to be positioned quickly and easily. A leveling mechanism allows the digging bar to be

adjusted to any angle regardless of the truck's position. This feature is especially helpful where, in some states, telephone wires are on light company poles and located lower to the ground, the company points out. Request NP745.

•

MICROWAVE RADIO SYSTEM—Microtel, a new 6,000-mc microwave radio system has been developed by Lenkurt Electric Co.

Two basic transmitter-receiver terminals—one with circulator and combiner-transfer panels in addition to the transmitter-receiver—are part of the Microtel development.

The new equipment, designated Type 74A, was developed by Lenkurt specifically for high-density microwave toll circuit needs at higher frequencies. It has been type-accepted by the Federal Communications Commission for the 5925-6425-mc common carrier band.

A 74A terminal can carry up to 240 voice channels. Using an r-f circulator, four terminals can be operated on the same antenna to provide a Microtel system capable of up to 960 channels.

The equipment can use either fre-

quency or space diversity. It has a frequency stability of 0.5 per cent and a transmitting klystron output power rating of one watt. Mechanically it features standard 19-inch rack mounting, compact plug-in construction and complete accessibility from the front.

Microtel can operate from standard office battery supplies or 115-volt ac current. Request NP746.

•

THREE CHANNEL TONE ALTERNATOR INTERRUPTER UNIT—A new design tone alternator-interrupter unit is now available from Holtzer-Cabot Telephone Division of National Pneumatic Co., Inc. The company reports the new tone alternator interrupter unit, designated MG-252, has the following characteristics:

Tone alternator output for dial, busy, long distance, signal and ring-back tones:

500 cycles, 2 watts, 7-9 volts, full load to no load.

600/120 cycles, series connection, phase 2, 4 watts, 9-12 volts, full load to no load.

600/120 cycles, parallel connection, phase 2, 4 watts, 4.5-6 volts, full load to no load.

600/120 cycles, phase 1 connection, 4 watts, 9-12 volts, full load to no load.

420/40 cycling 0.5 watts, 10-12 volts, full load to no load.

Drive Motor: Standard ratings are:
230 volts, 60 cycles, 3 phase.
115 volts, 60 cycles, 1 phase.
24 volts, direct current.
48 volts, direct current.

The interrupter portion of the unit contains provision for a maximum of 32 spring packs. Cams, and cam followers, are of nylon for maximum life, states the company. Five, six and eight-second timing cycles are available.

The tone alternator features permanent magnets and eliminates the necessity for slip rings and brushes and consequent maintenance, the company says. The tone alternator outputs are connected to a terminal board mounted in a convenient location on the side of the unit.

The unit is essentially a two-bearing motor-generator set having permanently lubricated, double-sealed wall bearings requiring no maintenance for the life of the bearings. The interrupter is driven through nylon spur gears which require no lubrication.

By mounting the interrupter on an "A" frame over the motor-generator set, the unit is unusually compact with overall dimensions of 6½-inches x 12⅜-inches x 9¼-inches high.

Available in standard telephone grey enamel finish, the machine is a compact complete package for all telephone tone and interrupter requirements, the company states. Request NP747.

•

ALL-ELECTRONIC TELEPHONE EXCHANGE—An all-electronic telephone exchange, has been designed and built by Pye Telecommunications Limited. There are no moving parts.

It is an internal private exchange only 20½ inches long, 19 inches high and 12 inches deep. It has just over 1000 components including 74 tubes of new type which completely eliminate the need for moving switches.

It is a ten-line exchange and larger exchanges are now being developed. The same principles used can be applied to a 10,000-line public exchange, it is said.

Features listed by the manufacturer are: It has a memory which holds a cell until the number is disengaged then automatically puts you through. It is instantaneous in operation, puts you through immediately. It uses less power and a fault can be traced merely by observing which tube is not glowing. There are no mechanical contacts and no sparks therefore these exchanges can be used in a mine or other explosive atmosphere, in fighting ships, anywhere. Request NP748.

•

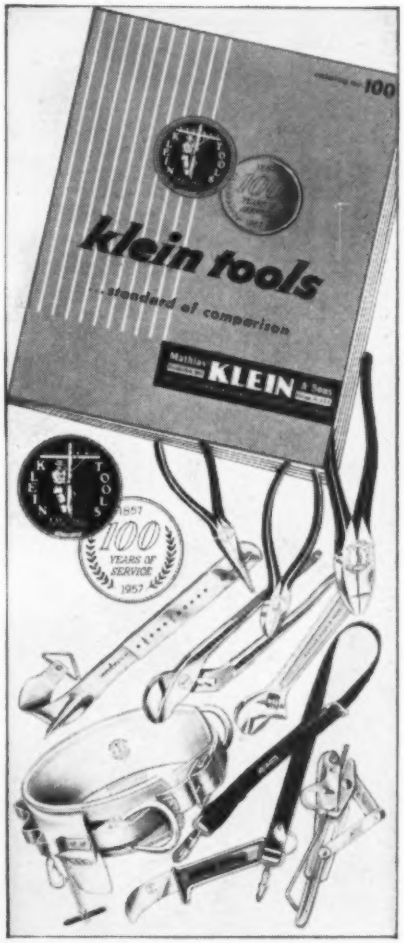
LIQUID LOCK WASHER—American Sealants Co. announces availability of a liquid lock washer, Loctite, designed to lock nuts on the bolts, on appliances and tools, etc.

The company states that Loctite is easy to apply. It is a thin liquid that wicks in between bolt and nut, hardens and holds tight. Locked nuts may be removed with ordinary tools, re-treated and re-used. Request NP749.

•

COMBINATION WORK BENCH AND SHOP DESK—A combination work

NEW
KLEIN
CATALOG
FOR
• LINEMEN
• ELECTRICIANS
• INDUSTRY



100 years ago in 1857, Mathias Klein opened a little forge shop in Chicago. Out of this has grown the national institution known as Mathias Klein & Sons.

To dramatize this 100 years of service to industry, Klein has prepared a completely new catalog.

It contains illustrations and descriptions of the wide range of pliers, grips, climbers, belts, safety straps—the tools and equipment needed by linemen, electricians and industry.

A new feature is a section giving the dimensions of each plier—length of handle, length of cutting knives, width of head, size of point, etc.

This Klein Catalog No. 100 will be of interest to linemen—electricians—good workmen everywhere. A copy should be in the hands of every purchaser of good tools. Write for yours.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

THE MAKING OF USS AMERTEL TELEPHONE WIRE

A story of Quality in four parts

PART IV:
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TO MAINTAIN the high standard of quality of USS Amertel high tensile wire, constant testing and research is necessary. Extensive process control testing for analysis, mechanical and electrical properties and for the zinc coating weight is performed during the manufacturing operations. This is followed by verification inspection and testing of the finished wire to assure that you receive the finest quality telephone and telegraph wire possible.

Constant research into the steelmaking process, heat-treating, drawing and coating methods conducted in our own laboratories results in the continued high quality of Amertel telephone and telegraph wire. Specialized studies of vibration fatigue properties in our modern Fatigue Laboratory provide technical information to further improve line construction methods and thereby reduce construction costs. This thorough testing is your assurance of a reliable, high quality product.

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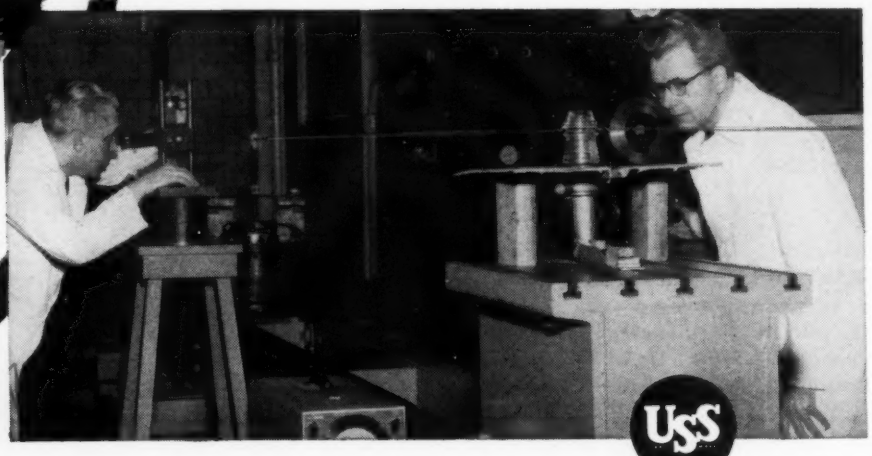
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York



USS

USS TIGER BRAND AMERTEL *Telephone & Telegraph Wire*

UNITED STATES STEEL

REX ONE PAIR CUTS POLE LINE COST

A Span lengths up to 600 feet are possible with Rex One Pair Distribution Wire. Extra service poles are eliminated on long extensions and long drop runs.

B Economically installed — no cross arms, pins, or glass insulators. Wire is simply installed on tangent supports and drive hooks.

C No tree leakage — a heavy extrusion of high molecular weight, high dielectric strength polyethylene, enclosing both conductors prevents accidental grounding and eliminates excessive right of way clearance.

D Excellent transmission characteristics — similar electrical properties to R.E.A. listed Rural Distribution Wire assure good subscriber service.

E Easily transposed — no special brackets; simply twist span at installation. Cross talk and induction noise are kept to a minimum.

F Ordering data: Two conductors #12 or #14 AWG Copperweld or .083 steel. 5,000 or 15,000 foot reels.

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EXCHANGE AREA CABLE
R.E.A. LISTED
DIRECT BURIAL CABLE
RURAL DISTRIBUTION WIRE
R.E.A. LISTED
URBAN DISTRIBUTION WIRE
'D' INSIDE WIRING CABLES

SEND FOR TECHNICAL SPECIFICATIONS and PRICES

REX WIRE & CABLE

Manufactured by

THE REX CORPORATION

100 HAYWARD ROAD, WEST ACTON, MASS.

INDEPENDENT

bench and desk made for common repair, test, and light assembly jobs that require both paper work and mechanical operations, has been announced by the Neubauer Mfg. Co.

Under its metal-edged, masonite top are two shallow drawers—a narrow one for paper and a wide drawer, subdivided into 24 compartments, for parts and small tools.

Two extra-large file drawers below accommodate blue prints, circuit drawings, instruction manuals, etc., and two open storage shelves provide space for bulky fixtures, test equipment and extra supplies.

Drawers may be inserted from the back to reverse the kneehole position. The 54-inch x 25-inch desk top is 36 inches high. Legs are fitted with adjustable glides for easy leveling. Request NP750.

IEI Conducts Management, Engineering Seminars

The Industrial Education Institute on Oct. 16 conducted a seminar on "Solving Industrial Problems Through Creative Thinking" in the Sheraton-Blackstone Hotel in Chicago. Representatives of the telephone industry —in the city for the United States Independent Telephone Association convention—were reported planning to attend, according to Gerard A. Glass, the Institute's executive director.

This seminar was conducted by David Hill of the Hercules Powder Co., and Dr. William Pinard, head of the psychology department, Boston University. Especially prepared for engineers, designers and other technical men, the seminar covered usable formulae for solving many types of industrial problems faster and more effectively.

Industrial Education Institute has scheduled a number of similar seminars in Chicago, Detroit, Philadelphia, Boston, Montreal, Pittsburgh, Toronto, Cleveland and New York during the rest of 1957. Topics include (in addition to the one mentioned above):

"Simplified Drafting Practices."

"Advanced Techniques in Functional Drafting."

"Clear Technical Writing."

"How to Improve the Performance of Managers."

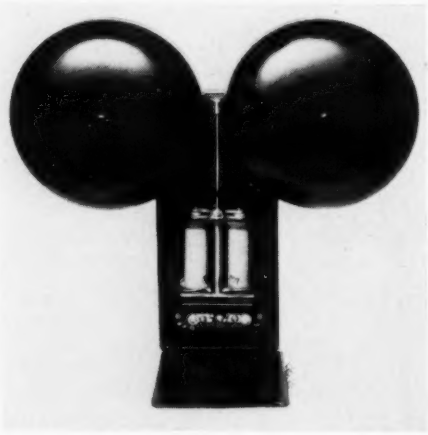
"Increasing the Effectiveness of Research and Development."

For further information on any of the IEI seminars, or to receive all future IEI announcements, write Industrial Education Institute, 25 Huntington Ave., Boston 16, Mass.

Financing Authorized for N. C. Independent

The North State Telephone Co., High Point, was authorized by the North Carolina Utilities Commission on Oct. 25 to borrow $500,000 in 25-year, 5½ per cent sinking fund notes from Connecticut General Life Insurance Co., of Hartford, Conn., to finance an expansion of its facilities (TELEPHONY, Aug. 3, p. 35).

The company in its petition said it has 29,997 customers at exchanges in High Point, Thomasville and Randleman; that it has spent about 5 million dollars for improvements over the last 10 years, and has applications from 577 more people who want telephones but cannot be serviced without additional plant expansion.



No. 198—6" Loud Ringing Extension Bell

THE INSIDE QUALITY STORY ON Suttle 6" Loud Ringers IN Harmonic • Decimonic Synchromonic and Straight Line Frequencies TO INCREASE YOUR REVENUE

The gongs are *real* bell metal—rugged, heavy construction (wt. 13 lbs.)—highest quality coils and reeds—weatherproof gasketed—built to last for years. Made to operate on *your* ringing machine —*your* wire—*your* phones.

Synchromonic: 16, 30 cycles (2,500 ohms); 42, 54, 66 cycles (1,000 ohms)
Harmonic: 16-2/3, 25 cycles (2,500 ohms); 33-1/3, 50, 66-2/3 cycles (1,000 ohms)
Decimonic: 20, 30 cycles (2,500 ohms); 40, 50, 60 cycles (1,000 ohms)

PRICE ONLY $24.80 ea.

High impedance (4,000 ohms) in any frequency with condenser, $4.00 extra.
No. 199: Straight Line, 1,000 or 1,600 ohms—Price only $15.85 ea.

SUTTLE EQUIPMENT COMPANY

Lawrenceville 782-3 135 S. La Salle St., Chicago 3, Ill. DEarborn 2-3108-9
Distributed by: Stromberg-Carlson Co., Leich Sales Corp., and Graybar Electric Co.

Collins Radio Names Texas District Sales Engineer

Garth L. Johnson has been appointed district sales engineer for Collins Radio Co. with headquarters in Houston, Tex., according to an announcement by T. W. Sharpe, Texas region sales manager for Collins. Mr. Johnson will serve microwave users, Mr. Sharpe said.

A native of Beaumont, Tex., Mr. Johnson previously served as a Collins field engineer and as sales engineer for the Dallas area. He is a World War II Signal Corps veteran, and for six years maintained navigational aids and communications equipment for the CAA.

Mr. Johnson has been a radio amateur for many years, and was one of the first amateurs to go on the air using single sideband techniques, the company states. His new address is 4918 Michael in Houston. His telephone number is MIssion 9-4995.

Completes 4-Month Study of United Telephone System

Soekhai P. Parsan, a veteran supervisor of the Government Rural Telephone System in Surinam (formerly Dutch Guiana), South America, has just completed four months observation and practical work at the general of-

fices of the United Telephone Co. in Kansas City, Mo.

His visit, arranged under the auspices of the International Cooperation Administration and the Federal Communications Commission, was organized to allow him to spend the majority of the study period in the United Telephone district offices where he could learn by practical experience; consequently he climbed poles, strung wires, checked circuits and performed all of the tasks American telephone men encounter daily.

Mr. Parsan was in demand as a guest speaker before civic and service groups wherever he went. Remaining in some communities for as long as two weeks, the 46-year-old visitor established many close contacts who were glad to learn more of Surinam while explaining the American scene.

"America," Mr. Parsan says, "is making a strong bond with democratic countries by sharing its knowledge and techniques which are the product of many years of research and millions of dollars. When you live among people you get to understand them better. Through the technical assistance and exchange student program the peoples of the free and democratic world have an opportunity to develop the close friendships and understandings which help to foster world peace."

S. P. PARSAN

Completing his stay in the Kansas-Missouri area, Parsan attended the United States Independent Telephone Association convention in Chicago, after which he went to Washington to make a report of his activities prior to returning to Surinam.

Name Head of New Microwave Electronics Lab at Rutgers

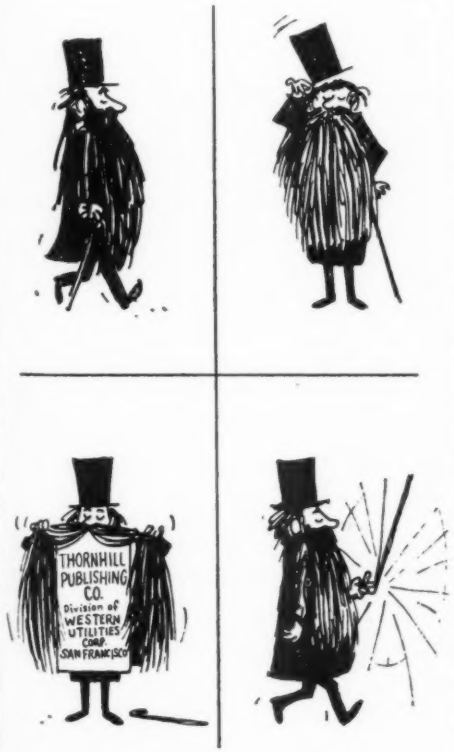
The appointment of Dr. Murray D. Sirkis, former research assistant professor at the University of Illinois, to head a new microwave electronics laboratory at Rutgers University, New Brunswick, N. J., was announced on Oct. 28, by Dr. Lewis Webster Jones, president.

Dean Elmer C. Easton of the Rutgers College of Engineering, said the new laboratory, one of very few in the country, will provide faculty members an opportunity to engage in research in the rapidly growing field of microwave technology. Courses of study in microwave electronics on the graduate level will be offered under Dr. Sirkis' direction.

The dean said Rutgers has established the unit in response to a growing need among New Jersey industries for persons with advanced training in microwave tube technology.

Research in microwave electronics may provide a key to future advances in military equipment, communications, chemistry and, perhaps, controlled nuclear fusion, it was pointed out.

Dr. Sirkis, author of several articles in the electronics field, is a 1951 graduate of Massachusetts Institute of Technology. He took his master's and doctor's degrees at Illinois.



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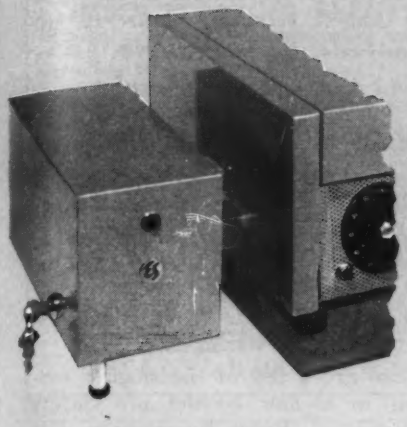
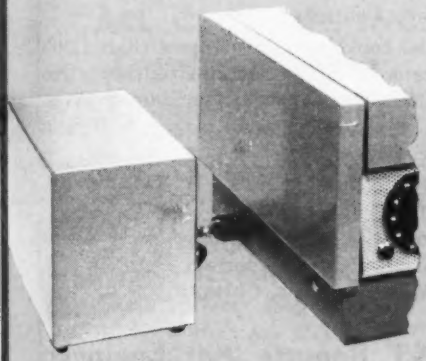


Remote Call-Back Addition for Model DCR-1 Electronic Secretary. Subscriber hears recorded messages by transmitting a tone signal over remote phone. Machine then switches to normal operation.



VCR-4 Voice Control Attachment for Model DCR-1 Electronic Secretary. Permits caller to record message for extended period of time. Message is recorded as long as caller continues speaking.

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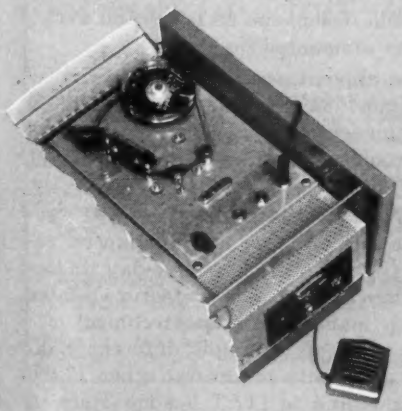

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Nevada Company Announces Two Appointments

Appointment of Earl Van Wie as general plant superintendent and Fred Welch as chief engineer of the Southern Nevada Telephone Co., Las Vegas, has been announced by H. G. O. Weiler, president.

EARL VAN WIE

Mr. Van Wie, who has been with the organization since 1945, first started in telephone work 22 years ago. He recently received the first national award of the Kellogg Switchboard & Supply

FRED WELCH

Co. for "technical contribution advancing the art of telephony."

Mr. Welch joined the company two years ago after serving International Telephone & Telegraph Co. for 30 years, 20 of which were in Shanghai.

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New Booklet Gives Slogans For Safety Promotion

"Drive as if your life depended on it—it does!"

"Safety is an investment only fools can't afford."

"It takes sense to avoid fires—dollars to pay their damages."

Those are a few of the slogans contained in a new booklet of "Safety Slogans . . . From Everywhere, For Everyone," published by the National Safety Council.

The booklet contains more than 1,000 slogans to fit any safety situation. "No matter what aspect of accident prevention you want to put across," says a flyer giving information on how to order the booklet, plus its cost, "safety slogans will help pave the way."

Copies of the flyer may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

IT&T Reports 200 Engineer Additions to FTL Staff

Since the first of the year, more than 200 engineers have joined the staff of Federal Telecommunication Laboratories, Nutley, N. J., a division of International Telephone & Telegraph Corp., it was announced on Oct. 14.

The appointments reflect an increase of almost 31 per cent in the number of engineers and scientists engaged in electronic research and development at the IT&T research center, bringing the size of the technical staff to over 800.

The majority of the engineers recently completed a twelve-day indoctrination program that featured talks by top management and technical officers, tours of the eight different FTL labs, and visits to several other IT&T divisions and to IT&T headquarters in New York City.

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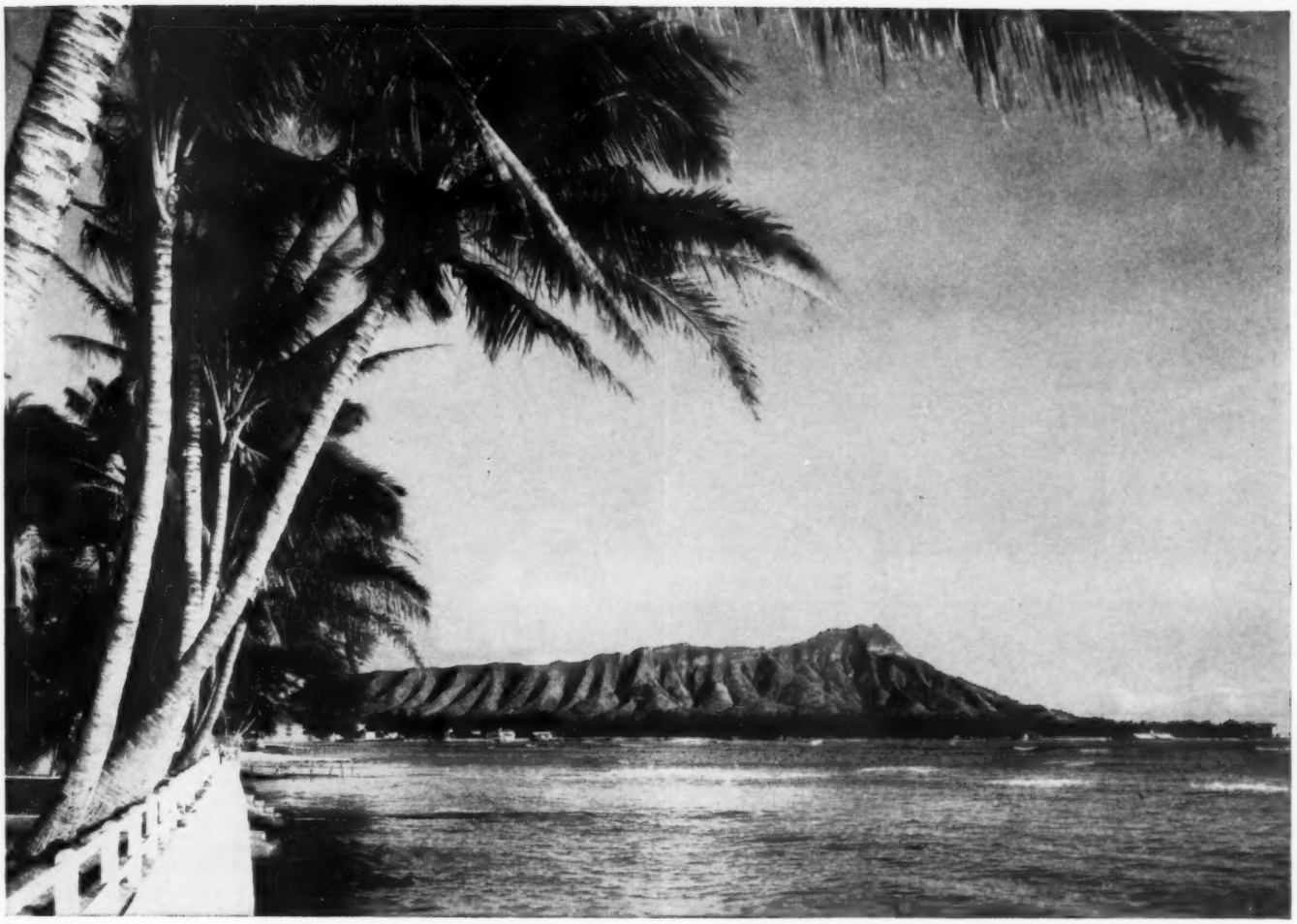

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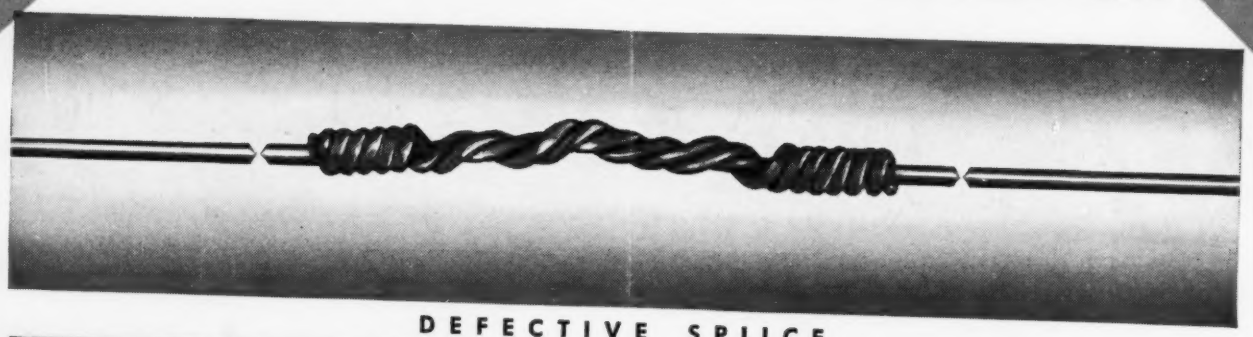

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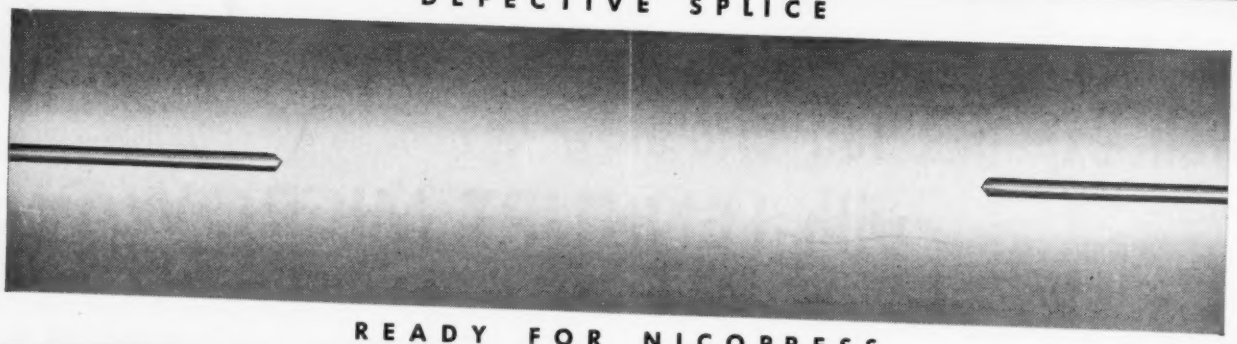

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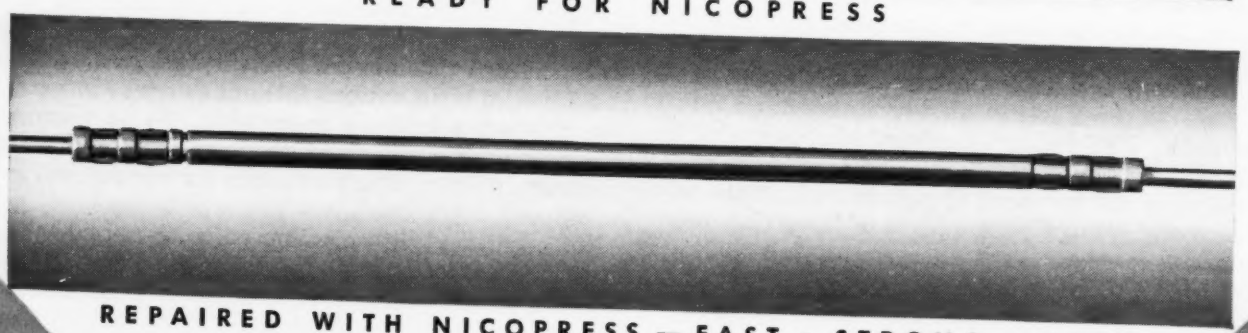

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